EDITORIAL

ARE the local water companies making preparations to meet the increased demand that will come after June 30?

INDEX to Volume IX of 'Metal Trades' is now ready for distribution, and can be obtained from the circulation department.

WHO comes nearest to earning his salary, the dollar-a-year man in Washington, the dollar-a-day man in France, or the man that hopes to get a dollar an hour in Pacific Coast shops?

SO effective have been the safety-first measures in California during the last fiscal year, that the actual number of fatal accidents was less than for the year previous, in spite of the vast increase of workers in industrial occupations.

SENATORS are amusing people, sometimes. Now they are howling their heads off because all of the sessions of the Peace Conference are not open to the public, while, they themselves, promptly go into 'executive session' whenever they are inclined to 'put something over'.

DISMISSAL of the charges of disloyalty against Senator LaFollette sounds like the Scotch verdict of 'not proven'. The record of his St. Paul speech as well as many more of his utterances remain to show the brand of Americanism exhibited by the honorable gentleman from Wisconsin in his country's hour of trial.

APPARENTLY the United States is not the only country that is suffering from government operation of railroads at a loss. Ivan Mikhailoff, minister of finance for the Omsk breed of Russian government, reports the Trans-Siberian railroad is losing money at the rate of 80,000,000 rubles per month. Still, it would be a lot worse if the Bolsheviki were running the road!

A STATE CHAMBER OF COMMERCE for Washington was formed last month. This will provide an authoritative body to take action on matters of more than local interest. The value of a local Chamber of Commerce has been demonstrated by the experience of many years, and recently we have seen what the United States Chamber of Commerce can do in the way of service. There would seem to be a middle ground between the spheres of activity of the local and national organizations that could well be occupied by a State body. California would do well to follow Washington's example.

THE suspension of politics during the period of the War has proved to have been but a temporary lull after all. Enter the muckraker. We learn that the Y. M. C. A. is a fraud, that Hog Island was a bottomless pit for the reception of wads of Government money, and so on, ad nauseam. No one denies that mistakes were made, and many of them, no doubt. The great outstanding fact remains that we did build ships; we did send two million men to France in spite of the submarine, and clothe and feed them too; and, our objective has been gained, we have won the War. Let these salient facts stand out above all the claque and clamor of partisan mouthings from the lips of office-seekers.

WE have all heard how pre-eminence in the production of dyes, potash, toys, and many other articles has passed from Germany since 1914, but few of us realize that control of the wild-animal industry is also to be counted among Germany's war losses. The principal inhabitants of Hagenbeck's famous zoo have gone to relieve the shortage of meat, and the same condition prevails in the smaller menageries. Deprived of her colonies, and with her commerce hampered or entirely cut off for some time to come, Germany has no way of replenishing her stock. Besides the two-legged ones with which the world has become far too familiar, Germany produces some four-legged beasts, but here the popular prejudice against articles 'Made in Germany' will interfere with their profitable exportation. We see no hope for this once flourishing industry.

JUST when we were getting started on the league of nations, and universal brotherhood, and all that sort of thing, along comes the House Committee on Immigration and reports in favor of a bill practically cutting off immigration from all the Old World and a large part of the New for the next four years. Considered merely from the standpoint of self-interest, the value of such a measure is more than doubtful. At the present time there is considerable unemployment, but this condition is probably only a question of months, and long before the end of the four-year period there is likely to be work for all the immigrants that can be persuaded to come here. Anyway, statistics show that immigrants do not come in any great number unless there is work for them. When work has been plentiful here, immigration has increased. Furthermore, most of the foreign governments can be trusted to keep their citizens at home during the next few years. Even if a restriction is needed, it can far better be accomplished by negotiation with the governments affected than by this broadside from Congress.

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Roosevelt

Death has taken one of the greatest of our presidents and the man that influenced his time more than any other American. To him it was given, as to few men, to reach the heights and plumb the depths of almost every human experience. He had his faults and few will deny that his usefulness was impaired by them. Yet that usefulness, both in his many official positions and as a private citizen was so great that adequately to measure it is impossible. Mourn his loss as we may, we cannot but be thankful that the end came comparatively quickly, and that with his tremendous energy he was not doomed to a long struggle against slowly failing physical powers. A man has gone from amongst us; we may not see his like again.

The League of Nations

While many details remain to be arranged, it is now certain that some sort of a league of nations will be formed. Probably any scheme of organization at this time will be relatively weak, similar in a way to the Articles of Confederation that formed the first bond uniting the thirteen colonies. You cannot get a perfect organization, or even a strong one all at once. It is entirely possible that some nation or group of nations may in the future undertake to test the strength of the league, just as the Confederate States experimented in 1861. Let us hope that the result will be the same. Anyway, all the nations willl find ultimately that it pays to accept the decisions of the league, even if, as will often be the case, such decisions are not entirely satisfactory to the parties concerned. The principal difference between democracies that endure and democracies that do not is that the former are mainly composed of good sports who are willing to abide by the will of the majority. The same reasoning will hold for the league of nations.

Medals and Jobs

Many years ago a father who gave his child a stone when asked for bread, was held up as an example of inhumanity. Uncle Sam's nephews are coming home from their job of defending America and American ideals, and they want jobs, but many people seem to want to give them medals instead. On a par with this idea is the proposal in one of the Bay cities to raise a fund of $75,000, $10,000 of which is to be used for the laudable purpose of finding jobs for the returned soldiers, and the remaining $65,000 is to be 'blown in' on a series of celebrations of their return. "A pennyworth of wholesome bread and an intolerable deal of sack." What is needed is a careful study of the situation, and also a willingness on the part of those who can afford it to proceed with the ordinary activities of business without waiting for the decrease in prices that, after all, may not come for some time. As for those firms which have not restored returned soldiers to their old positions, some of them are undoubtedly facing serious problems in this regard. But even if it is impracticable to place the soldier in his old position, or in some other equally good, the concern is morally bound to see that he gets a job somewhere and to look out for him until he does get it.

Exit John Barleycorn

Hail, Booze. We, who are about to thirst, salute thee. It is no disrespect to paraphrase the immortal words of the gladiators to Caesar, to herald the passing of the cup that cheers. What a hullabaloo of speeches, printer's ink, and every weapon convertible to the use of man have been brought to bear to keep these United States of America wet, and all to no avail. Whether you like it or not, individually, the great cogent fact remains, that the majority of the people said 'dry', and 'dry' it is after July first next. The man who has been in the habit of having his little 'nip' at regular intervals may extract some comfort from the fact that the Monday-morning absentees at the shop will be less; the Monday-morning grouches will be fewer. The last boat on Saturday night may be taken off; the 'funny' papers will have to find something to cartoon other than the well-worn view of paterfamilias in his stocking-feet weaving about on the porch in a vain endeavor to find the keyhole. All sorts of interesting, amusing, pathetic, and tragic accompaniments to this thing we call life have been summarily wiped off the board. In the meantime, one of the interesting side-lights of the passage of the 'dry' measure, lies in the frantic scurrying to and fro of the steady imbibers to whom a certain amount of alcohol is both food and drink, in order to stock up on wet goods in sufficient quantity to stave off the evil day when aqua pura will be the only available means of wetting one's whistle. Alas, alas! we have come on parlous times indeed. The drinking songs so prominent in opera bouffe are now preserved in alcohol; bromo seltzer is no longer the first aid to that tired feeling, and the rich man's club and the poor man's saloon robbed of that artificial producer of jollity, all we can say is that apoplexy will be less frequent, cirrhosis of the liver will be found only in the dictionary, the divorce courts will adjourn twice a week for golf, and the pay envelope will be both fatter and less leaky between quitting time and home-coming. So go ahead and be darned to you. We don't care, and hope you don't either.

Standardization of Wages

There seems to be a tendency to try to load the Peace Conference with a lot of jobs that had either better be left undone or else postponed. One of the latest of these proposals is the plan, said to be British in origin, for an international tribunal for 'the adjustment of labor conditions.' If this phrase means anything at all, it means standardization of wages and conditions.

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When one considers the troubles that the War Labor Board was having before the armistice with standardization in a few industries in one country, one realizes that the proposed tribunal would have some work to do. Standardization cannot be entirely in one direction; there must be some leveling down as well as leveling up. Since wages and standards of living in America are higher than in any other part of the world, standardization would inevitably be against the interests of American labor, and, in the long run, of American capital as well. It may be objected that, if we are going in for foreign trade on the scale expected by many people, competition in the world's market will bring standardization. This standardization, however, if it comes, will be of labor-costs per unit of output, which is a very different thing from standardization of wages. Aided by labor-saving machinery and by efficiency in other departments, the American workman has been able to increase output to such an extent that high wages have frequently meant low unit labor-costs, and there is good reason to hope that this condition will continue. Of course, the international tribunal might try to standardize unit labor-costs instead of wages, but that would amount to putting the whole world on a piece-work basis, which, whether advisable or not, is not feasible. If there is any standardizing to be done, let the law of supply and demand attend to it, as has been the rule heretofore.

The Victory Loan

While the exact details are yet to be announced, we know that the Fifth Liberty or Victory Loan will be offered early in April, that it will be between $5,000,000,000 and $6,000,000,000, and that, unless something remarkable occurs, such as the resumption of hostilities on a large scale, it will be the last of our present war-loans. It is also probable that the bonds will mature in five years, and that, as is proper for such short-term securities, the interest-rate will be higher than for the earlier issues. Since the armistice there has been a noticeable, and perhaps unavoidable, 'letting-down' throughout the country. Hostilities are over, and the necessity for continuing the unpleasant but salutary economies and other efforts to win the War is not so apparent as it was. It is to be hoped that this spirit will not interfere with subscriptions, nor with what is perhaps even more important, namely, making the necessary arrangements for paying these promptly and not increasing the load on the already overburdened banks. The success of the Loan requires a subscription nearly as great as the Fourth Loan. Many persons and corporations that subscribed large amounts to the Fourth Loan will not be able to do as well this time because of being obliged to prepare for income-tax payments. Many smaller subscribers, both employers and employees, will have to reduce their subscriptions, the first class because of poorer business conditions, and the second because of unemployment. It is up to those of us who can, to do as well or better than we did on the Fourth Loan. It is true that this money is not going to get on the firing-line like the earlier loans. However, money spent for a new machine-gun now in some arsenal, which may never, and we hope will never, be fired, was just as important for winning the War as the money that went for a shell fired at Chateau Thierry. Military experts agree that the German collapse was largely due to the knowledge that the United States was in the War with both feet and for ten years, if it took that long, getting meaner and more determined every year. Let us finish the job, and bring the rest of the boys home as soon as is feasible, by an over-subscription!

Contractor's Machinery

For nearly two years, contracting, except for direct or indirect war work, has been 'dead'. Even when owners were ready to go ahead, the regulations of the various Government agencies made construction almost if not quite impossible. Now all restrictions have been removed, but the high price of materials and labor remains to discourage any considerable amount of work on the two years deferred construction program of the country, which must amount to several hundred million dollars worth of work in all. Will this program continue to wait until that uncertain time in the future when prices return to more normal levels? We think not. Public work in particular is likely to revive sooner than private work, since public work in the nature of things is seldom planned with an eye to future dividends. Again, the logical way to tide over the periods of unemployment caused by the inevitable readjustments to peace conditions is to give the surplus labor the opportunity at least to be employed on public works. In particular we may expect increased activity in highway construction. The War impressed the need of improved roads upon the public mind as it has never been impressed before. There is another reason to expect that present price conditions will have less effect on highway work than on other kinds of construction. Concrete is the principal item of cost of most improved roads, and the price of materials—cement, sand, and rock—which includes most of the cost of concrete, is little more than the pre-war price. A dollar of the public funds invested in improved roads comes nearer to buying a dollar's worth according to pre-war standards than a dollar invested in almost any other way. Already a realization of this fact by public officials is having results. The Oregon State Highway Commission has awarded nearly a million dollars worth of work and expects to let contracts for several million dollars more during the year. As much work if not more will be done in California. What has this got to do with the metal trades? Simply this; the highway contractor, to meet high labor costs, must have labor-saving machinery, and he will be in the market for steam-shovels, concrete-mixers, gas-engines, industrial-railway equipment, pumps, water-pipe, shovels, and a great deal of other ma-

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chinery and equipment. Will he, as in the past, be compelled to buy almost entirely Eastern-made equipment? The answer to this question must come from the Californian manufacturer.

The U. S. Employment Service

Starting with the establishment of a few employment offices a year or so before this country entered the War, the United States Employment Service blossomed rapidly into a great nation-wide organization that last summer controlled by law the supplying of labor to many industries and exercised a considerable influence over every industry. Liberal appropriations were made for its work, and the Department of Labor is now asking Congress for $14,000,000 for the activities of the Service during the fiscal year ending June 30, 1920. Before any appropriation is made, however, those in charge of the work of the Service should state definitely whether this money is to be spent in the same way as past appropriations have been, or whether it will be spent on the legitimate activities of a Government bureau representing the entire public. We know that a good deal of money was spent here on an investigation in a field properly belonging to the Department of Justice and conducted by men temperamentally unfitted for any sort of investigation, judicial or otherwise. The misue of public funds in other lines has, however, been more serious. Soon after America entered the War, the general principle was laid down by several Government departments that as far as they were concerned there should be no interference during the War with established conditions in factories having Government contracts. Open shops were to remain open and closed shops closed and the right of workers to bargain collectively, to join a union, or to refuse to join one was to be sustained. It may be that the Employment Service tried to follow this policy. If so, the attempt was a pitiable failure. In particular, its agents have gone to open-shop towns in Michigan with the avowed purpose of 'organizing' those towns, and have delivered the principal addresses at meetings for that purpose. Instances might be multiplied where the machinery of the Employment Service has been used to make it easy for a union man to get a job and hard for a non-union man. Organizing a union is legitimate for the proper parties, but the Employment Service is doing harm both to the unions and to everyone else by getting mixed up in such activities. The Department of Labor has done good work in the past, and is doing some good work now. It is high time for it to come clean and devote itself hereafter to activities that will redound to the benefit of industry in general, and not to the fancied advantage of a particular body of workers. It has a great opportunity for leadership in constructive service in the solving of the problems of unemployment during the present readjustment period, but it cannot expect to obtain that leadership unless it takes steps to regain the confidence of the general public, which it has forfeited.

Strikes and Rumors of Strikes in the San Francisco Bay District

At this writing, January 29, the California Metal Trades Association, the California Foundrymen's Association, and the organizations making up the Iron Trades Council, are voting on the compromise offer of the conference committees. This compromise provides that the Macy wage scale of October 24, 1918, shall be put into effect as of January 20, 1919, and shall be effective to April 1, 1919, or until such time thereafter as shall be mutually agreed. It also provides that

"In consideration of such extended agreement an additional amount shall be paid men working in shops between October 24, 1918, and January 18, 1919, inclusive, such amount to be calculated as the difference between their actual paid rate for time worked and the new rate effective January 20, 1919, and no other amount shall be demanded or paid.

"The amount shall be paid in three equal installments, payable February 3, 1919, March 3, 1919, and March 31, 1919."

In case this compromise is refused by either party, a strike on February 1 seems inevitable.

The situation is complicated by the demands of the Maritime Bay District Council, which consists of shipwrights, calkers, joiners, boat-builders, and mill-men. These unions, although members of the Iron Trades Council, are making demands directly on the ship-yards as well as on other employers. In a letter to the employers, the Maritime Bay District Council states that its demands shall be effective as of August 1, 1918. Among other demands, it states that calkers are to receive $8.50, loftsmen $8.40, joiners, boat-builders, mill-men, and shipwrights $8 per day. A 44-hour week is demanded with pay on company time. The second and third shifts are to have 10% bonus and a half-hour for lunch on company time. Business agents are to have free access to yards at all times. A trained nurse is to be in attendance wherever men are working and all help shall be hired either through the union or the U. S. Employment Service.

Boiler-Makers Union No. 233 has arbitrarily discontinued piece-work in the yards of the Moore Shipbuilding Co., Hanlon Shipbuilding & Dry Dock Co., and the Bethlehem Alameda Plant. This is in direct violation of the Macy decision and the Iron Trades Council agreement with the California Metal Trades Association. The union claims that there should be an increase in the piece-work rate corresponding to the increase in the day rate, but the employers declare that the piece-work rate is not affected by the cost of living, as the guaranteed day-rate, which is the minimum, takes care of that. Since discontinuing piece-work there has been a noticeable reduction in the amount of work done. It is stated by some of the employers that there is evidently a quota of rivets per day which the men are not permitted to exceed by the union. In one case, a riveter was found loafing at ten o'clock in the morning, and he stated, in reply to the

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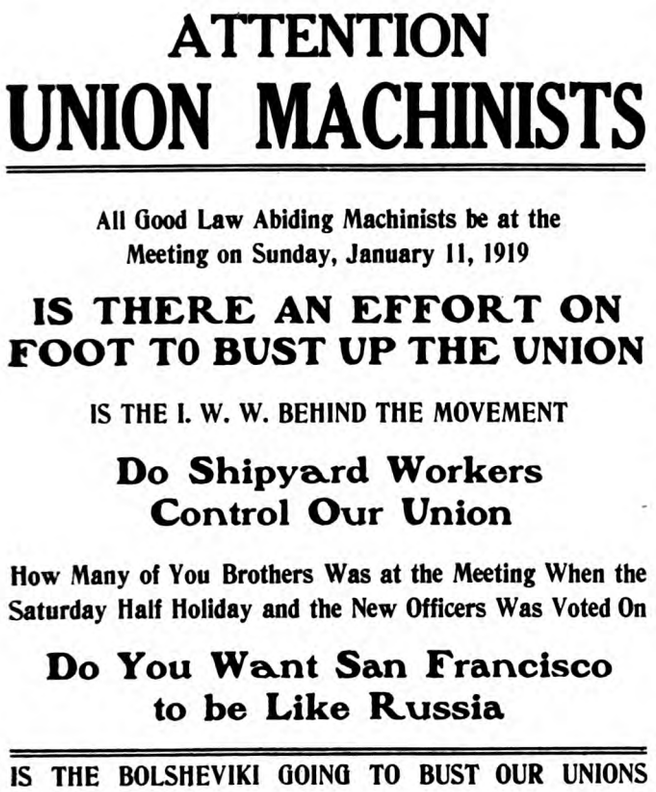
foreman's inquiry as to what he was doing, that he had finished his work for the day. The business agent tried to have this man reinstated, but was not successful, as he did not care to put in writing the fact that there was a certain quota of work. Several hundred men have been discharged for loafing, and now the rest stretch their quota over the full eight hours.

At the shops of the Main Iron Works 103 machinists and helpers walked out early in January. The company had received notice from the Emergency Fleet Corporation to reduce the working force because of the armistice and because there was no necessity for rush work with its consequent heavy cost. The management thereupon began to shift the more valuable men to the shops where they were most needed, and 31 men were let out from


ATTENTION
UNION MACHINISTS

All Good Law Abiding Machinists be at the Meeting on Sunday, January 11, 1919

IS THERE AN EFFORT ON FOOT TO BUST UP THE UNION

IS THE I. W. W. BEHIND THE MOVEMENT

Do Shipyard Workers Control Our Union

How Many of You Brothers Was at the Meeting When the Saturday Half Holiday and the New Officers Was Voted On

Do You Want San Francisco to be Like Russia

IS THE BOLSHEVIKI GOING TO BUST OUR UNIONS

Facsimile of a Poster That Was Distributed Through the Machine-Shops by Some Conservative Members of the Union. The Result Was a Large Turnout at the Meeting, Outnumbering the Radicals, and the Strike Vote Was Lost.

the fitting-out dock. One man, Haglestein, was ordered to report to shop No. 2. This he declined to do. He was then informed that he could either report to shop No. 2 or resign. He still refused and was discharged for insubordination. After his discharge the union stated that he was a shop-steward and demanded his reinstatement, claiming he was discriminated against because of the fact that he was a steward. In is interesting to note that another workman had been recognized by the company as shop-steward and that Haglestein had never been active in this capacity. The business agent claimed that a promise was made by the outside superintendent of works that Haglestein would be reinstated, and that the officers of the firm failed to keep their promise. According to the union's claim, the walk-out was ordered because of the failure to reinstate this man. The act of the union in ordering the walk-out without submitting its grievances to the Iron Trades Council was in violation of the agreement between that organization and the California Metal Trades Association. On January 27 the men returned to work by order of the Iron Trades Council. Because of the arbitrary action of the business agent, the Main Iron Works has been held up in its production and the workmen have lost three weeks time. Had the prescribed action been taken by the business agent, the unjust demand would have been settled by the proper authorities and no loss would have been occasioned by either the firm or the workmen.

On the 24th of January the sheet-metal workers at the Bethlehem Alameda Plant were called out because the company would not discharge a foreman who refused to pay union dues. At this date the men are still out.

At the plant of the Union Construction Co., 75 carpenters were called out January 25 by the business agent of the Building Trades Council because he was not given free access to the yards. These men are still out.

The Apex Manufacturing Co. of Emeryville, engaged in the manufacture of life-boats and life crafts for the Emergency Fleet Corporation, paid the retroactive wage to its employees from October 1 in accordance with the ruling of the Macy Board. The men accepted this payment, but after a few weeks came back with a demand for retroactive wages from August 1 to October 1. They included with this demand a notice that, effective February 1, their wage-scale would be $1 per hour, and that they would work only 44 hours weekly.

On the refusal of the firm to pay the retroactive wages from August 1 the men walked out on January 25 without submitting their grievances to the Iron Trades Council. At this date the men are still out.

NOTE. Since the above was written the compromise proposed by the conference committee has been accepted by the California Metal Trades Association and the California Foundrymen's Association and by the Iron Trades Council. On the other hand, the boiler-makers in the San Francisco shops outside the shipyards have voted to strike on the question of retroactive pay under the Macy scale from August 1. The Oakland Boilermakers' Union is taking a referendum vote on the question of accepting the Macy award. At a meeting February 2, the unions comprising the Maritime Bay District Council will take a strike-vote. The War Labor Board is expected to take a hand in the attempt to adjust differences. As far as the shipyards are concerned, the attitude of the Emergency Fleet Corporation seems to be to make no special attempt to avert a strike, either here or in the yards in the North-West. Any increase in wages in the shipyards would, of course, have to be borne indirectly by the whole country in increased cost of ships. Now that the signing of the armistice has eliminated the emergency, it is safe to say that if ships cannot be built at least as cheaply as at present, they will not be built at all. If this happens, the unions will have themselves to thank.

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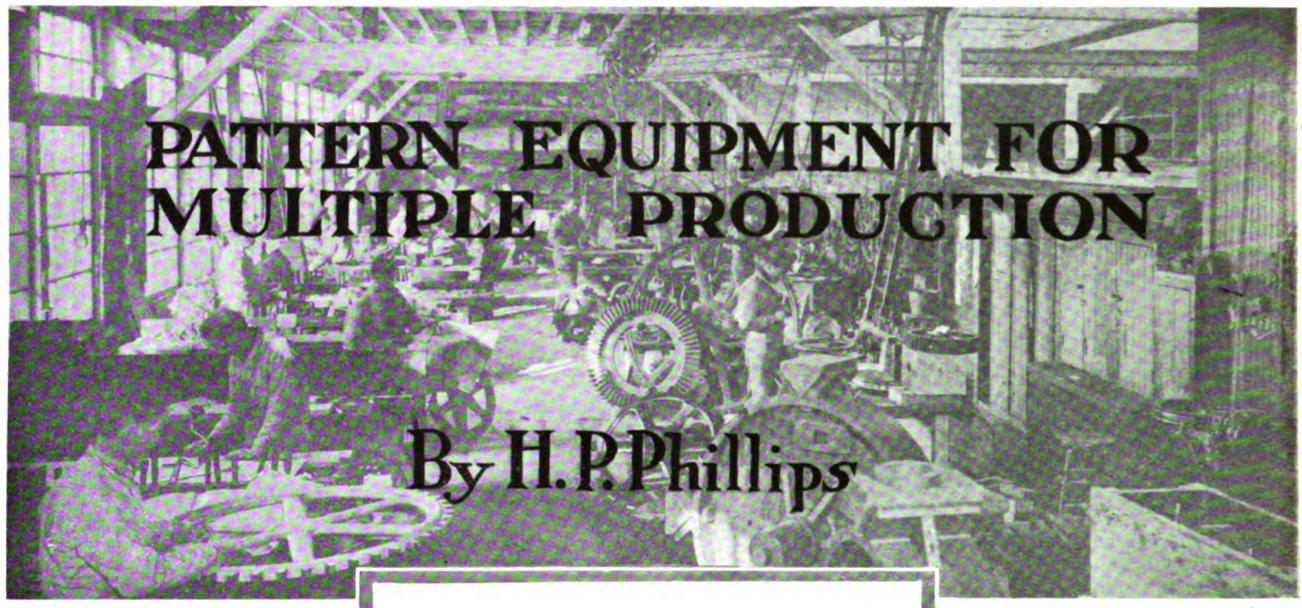

PATTERN EQUIPMENT FOR MULTIPLE PRODUCTION

By H. P. Phillips

QUANTITY production in one department is of little value in producing dividends unless the other departments adopt the same methods. This article tells how changes in the pattern-shop, particularly the use of multiple patterns, has enabled one Californian company to turn out more and better castings at a lower cost and with less-experienced men. Mr. Phillips is factory superintendent for the Meese & Gottfried Company.

BEHIND the lines of the manufacturing machine-shop must be provided a well-organized and never-failing stream of its munitions of warfare, an ample supply of correctly made castings. Production cannot be maintained without this supply, and the transition from a jobbing-shop basis to something approaching a manufacturing standard is sure to be accompanied by a heart-breaking period of defective castings, and delays due to inadequate pattern equipment. The old idea of having a lot of loose patterns to be thriftily dead-headed into odd flask corners explodes after trying to get out two or three rush orders for 1000 each, and, when the machine-shop starts using a few strange devices known as 'jigs and fixtures', and suddenly becomes fastidious about accepting castings that show signs of too liberal rapping, it gradually dawns on the organization that the place for manufacturing to begin is the pattern-shop.

One of our chief difficulties was a small idler-pulley, 6 in. diam. by 4 in. face, with a central hub 2 in. long, cored to bore 1¼ in. The maximum limit in the foundry seemed to be forty per day, and this only on days when the molder happened to be in a good humor, and did not cherish his usual antipathy to repetition work. Inspired by the success of the sales department in finding use for a great many of these pulleys, a new method of machining was developed, making it possible to finish more than 200 per day, and the equipment shown in Fig. 1 was devised to meet the foundry requirements.

As the pulleys are not turned, but are ground with a wide face-wheel, it was important to produce a perfectly round casting, with a straight true face, without fins or ridges. Four turned aluminum patterns, with no draft on the outside diameter, are mounted on an aluminum backing plate. The position of the hub was changed, making the pulley flush on one side, permitting the casting to be made entirely in the drag. A cast-iron stripping-plate insures a perfect draw, with no breaks in the mold, giving a casting requiring a minimum of machine work. An unskilled man was trained for the job, and 200 castings made regularly for the day's work.

Under present labor conditions, another source of continued delay has been core-making, and our constant aim has been to eliminate cores as far as possible from our multiple patterns, or else to use gang core-boxes. A popular type of bearing was continually appearing on the shortage list, due to lack of cores, and we finally altered the design entirely, so as to make the castings in green sand. Fig. 2 and 3 show the patterns, and a mold ready to close. The daily output has been materially increased, and the castings are true to pattern, requiring practically no fitting or machining, thus materially reducing the cost.

Another case of avoiding the core-room is shown in Fig. 4 and 5. This casting is a small rope-sheave, about 3 in. diam., of which a large number were required quickly. The groove is made by means of a loose piece on the pattern, in connection with a cheek-frame between cope and drag. The centre core also was made in green sand, by

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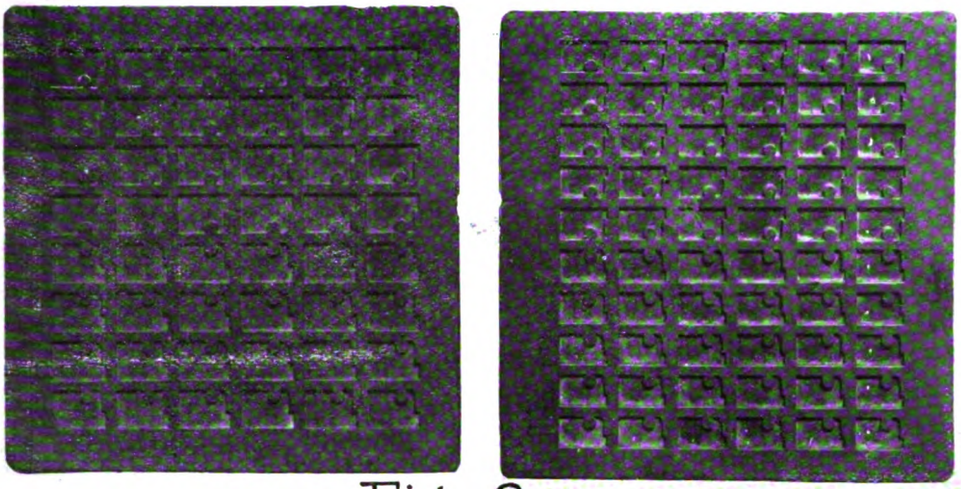

Fig. 8

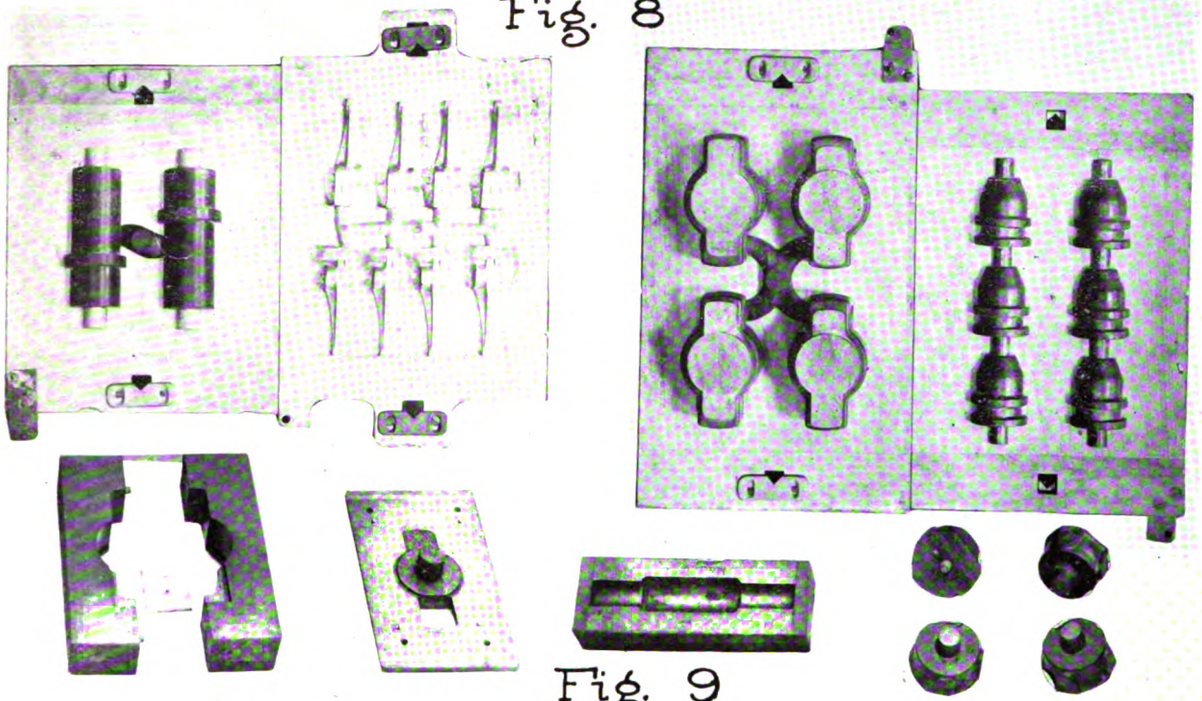

Fig. 9

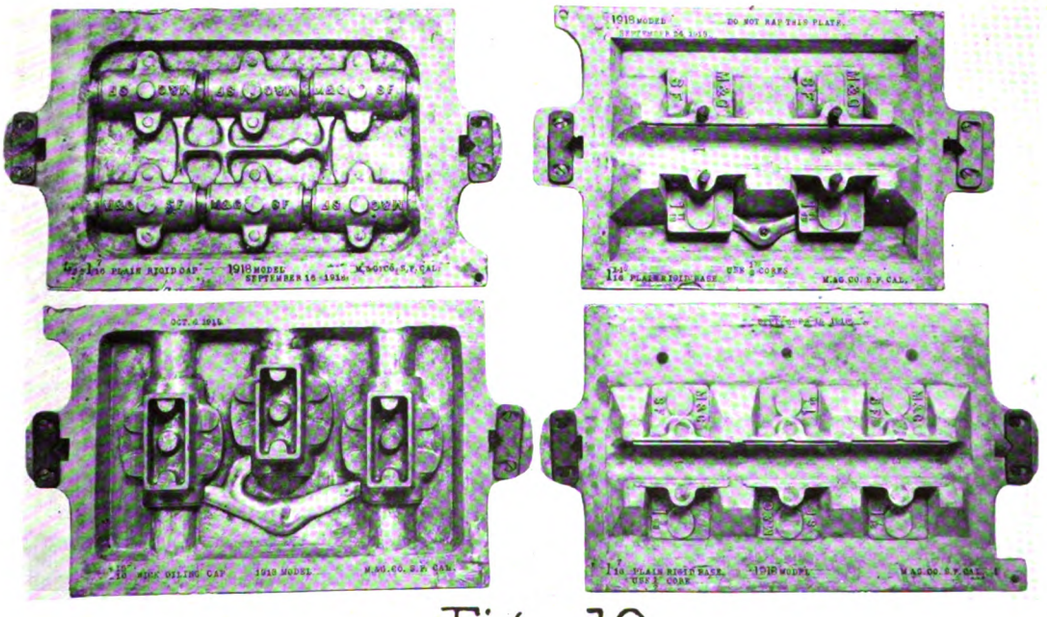

Fig 10

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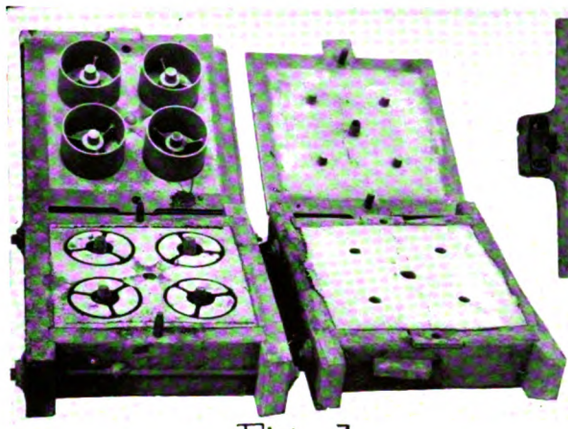

Fig. 1

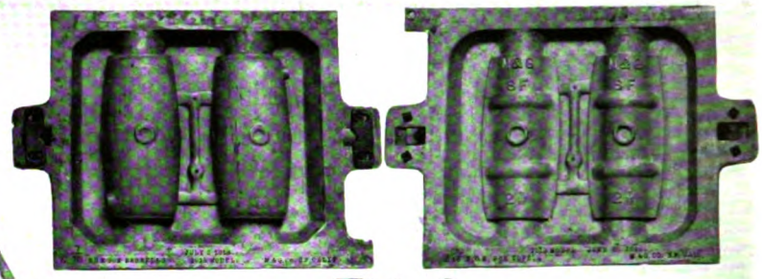

Fig. 2

Fig. 3

Fig 4

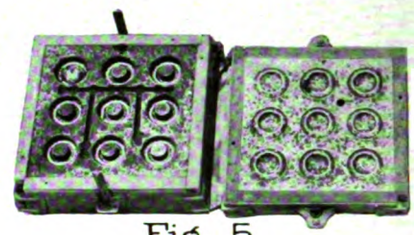

Fig. 5

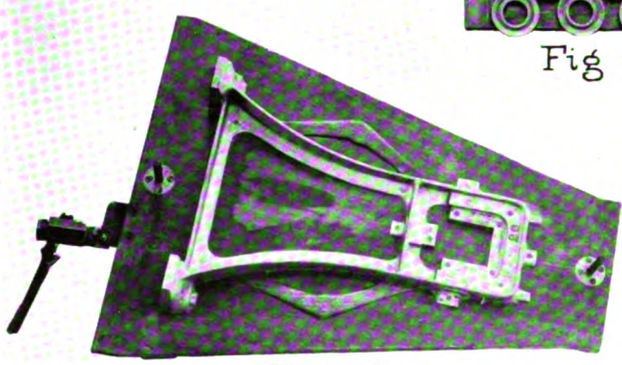

Fig. 6

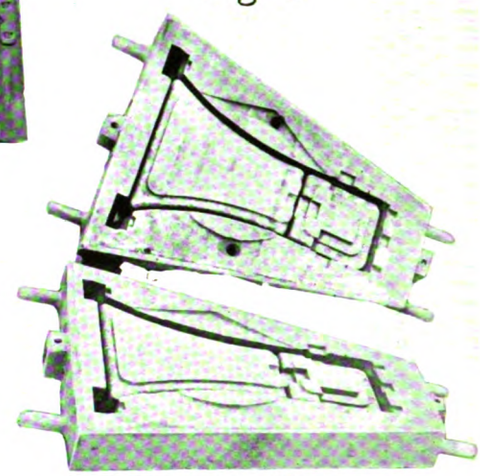

Fig. 7

means of brass bushings in the patterns, giving a generous draft.

The equipment for one of our standard drop hangers appears in Fig. 6, as well as a set of molds, in Fig. 7. These patterns are made in half section from aluminum, securely fastened to a plain wooden board. Accurate placing of pattern and flask-pins, which are held in adjustable sockets, is an important point in connection with using half patterns, or else fins and shifts will occur. Iron flasks are used, cope and drag being alike, drilled to templates to match the pins in pattern-boards. Cores are used for feet, and for bolt-holes, and no machine work is required on the casting. Multiple core-boxes are as important as multiple pattern equipment, and must receive the same care and treatment, or delays will be frequent. Two gang-boxes are shown in Fig. 8, from each of which three or four plates are sufficient to supply a molder for a day's run.

Other examples of the way we have mounted all standard patterns are shown in Fig. 9 and 10, which require little explanation. Wherever a pattern is in continuous or regular use, we have adopted the aluminum matchplate as standard. It is not cheap, but it is accurate, requires little repair work, and its first cost is distributed over many castings. Where an irregular parting is necessary, an aluminum plate is economical in molding cost, even when a comparatively small number of castings is required. For plain patterns where the number of orders is not particularly large, we use hardwood patterns, mounted either on steel plates or on wooden boards.

Flask-pin centre-distances are standardized, and adjustment is made by means of loose pieces screwed to the plates. Male and female gauges are used to check flasks and plates, and to keep them in alignment. Vibrator-tabs are cast on, or else securely fastened to the boards, and damage from careless rapping is minimized.

The advantages we have gained from a consistent policy of extending our pattern equipment along these lines, have been a more uniform product, and greater facility in filling orders. At the same time, it has been possible for us to obtain our standard line of castings from less experienced men, at a time when, owing to labor conditions, real molders have not been available for plain repetition work.

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GANG-PLOW AND TRACTOR
Holt Manufacturing Co.

Agriculture and the Metal Trades

By A. T. Parsons

TOGETHER with the fighting man, the munition-maker, and the shipbuilder, the farmer has held the centre of the stage for the past two years. Now that the armistice has been signed, the first two occupations have become less important, leaving only shipbuilding to rival agriculture. When the toll of the Kaiser's submarines has been replaced and the shipbuilding industry becomes normal again, the farmer will still be on the job, representing the world's greatest industry and, incidentally, one of the greatest consumers of machinery and metal equipment.

Next to warfare and the chase, the earliest uses of metal were probably in agriculture, although some backward tribes still use a crooked stick for a plow. As in so many of the other industries, there was relatively little advance in design from prehistoric times to the beginning of the last century. Crude plows, pulled as often by man-power as by animals, and cruder harvesting equipment comprised the farmer's implements. As a result, it took the entire time of nearly all the population to produce enough food to keep themselves alive. Whenever a poor harvest occurred, the small accumulated reserve was wiped out and famine was the inevitable result. Approximately the same condition prevails today in India, where 90% of the population is engaged in agriculture, and the average holding is ten acres of dry or five acres of irrigated land. No need of a 'Back to the Land' movement there to stimulate food production! Yet although relatively little food is exported, the people of India are not nearly so well fed as the people of the United States, where less than one-third of the population is on the farms, and a tremendous amount of food is exported. That two-thirds of us here in the United States are able to engage in other work than farming is mainly because the American farmer generally has machinery and knows how to use it. With all his faults, the American farmer, like the American in most other pursuits, produces more per capita than the farmer of any other country. Furthermore, statistics for the various States show that the per capita production from the farms, varies almost directly with the per capita investment in farm machinery. People discussing the high cost of living frequently mention the decreasing proportion of farm-workers to total population and they talk of methods of getting men back to the farms, but it will be hard to check the drift toward the cities, even if we were sure that it would be desirable. Any considerable reduction in the relative cost, not the nominal cost, of food will probably have to come through increasing the farmer's efficiency and per capita production by providing him with more and better machinery, rather than by increasing the proportion of farm-workers.

No reliable statistics exist regarding the division of the California and Pacific Coast farm-machinery and equipment market between the local and the Eastern manufacturer. In almost every line, firms of both kinds are represented. In some lines, such as centrifugal pumps, the California manufacturer has the lion's share of the market. In others, such as cream-separators, the advantage is probably the other way. Most of the Cali-

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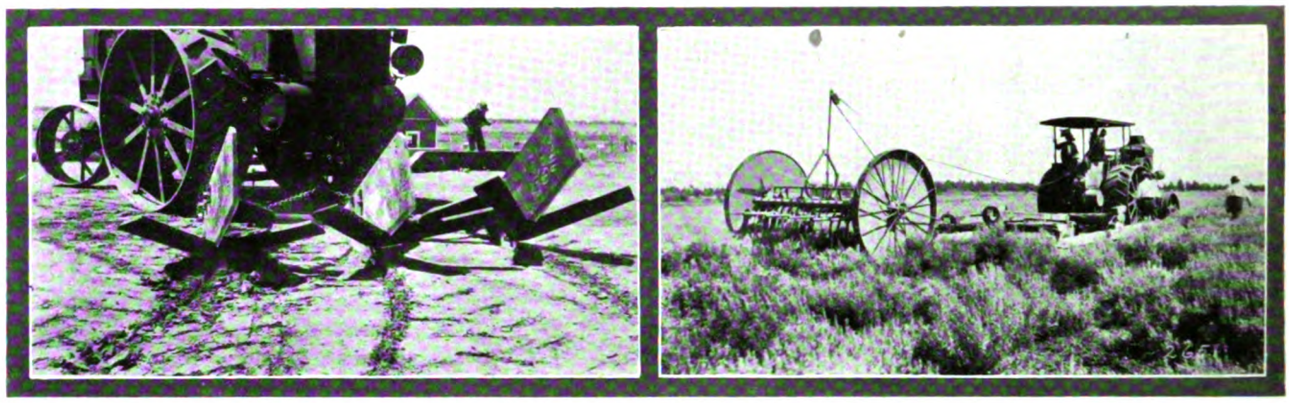

AT LEFT—KNIVES FOR CUTTING SAGE-BRUSH BELOW GROUND. AT RIGHT—CUTTING-DEVICE PULLED BY TRACTOR AND FOLLOWED BY RAKE.

Advance Rumely Thresher Co., Inc.

fornia factories started with a small shop in the rear of the local hardware store, so that it is natural to find them in the towns adjacent to large bodies of farming land rather than in the San Francisco Bay district. Stockton, Fresno, Los Angeles, San Jose, and Sacramento all have factories producing equipment that sells not only in California, but also in other States, and, in some cases, in foreign countries. Several of the smaller towns also have factories that, by concentrating on one or more specialties, have built up more than a local business.

The plow is one of the oldest farming implements and also one of the most thoroughly standardized. So also is the disk-harrow. The introduction of the tractor and the need for deeper plowing, however, have caused the use of heavier equipment and, in some cases, changes in design. There are sub-soilers weighing over a ton, and designed to cut four feet below the surface and to be pulled by one or more 75-hp. tractors. Other special cultivating implements are clod-mashers and rollers. The latter are principally used in 'dry-farming' to compact the soil and produce a good mulch. As the few remaining unappropriated water-supplies in the West are developed, attention will be directed more and more to 'dry-farming'. This kind of agriculture to be successful requires large-scale operations and heavy machinery, and the market for this class of equipment may be expected to increase.

Closely allied to cultivating machinery is the equipment for leveling land for irrigation and for making small drainage and irrigation ditches. The equipment used for the larger ditches and levees is usually of a different type, and should be classed as contractor's rather than agricultural machinery. California and Utah were the first States where any large amount of irrigation was attempted, which fact is reflected in the names of the two principal earlier devices for leveling land, the fresno and the mormon scraper. Several weird implements intended to be drawn by many animals and by which one or more men could do a tremendous amount of work have been devised. Unless the junkman has seized them recently, the remains of a large grading-plow intended for sixty oxen still lie exposed to the San Joaquin valley sun. However, the practical difficulties of handling any large number of animals on one machine has limited the size of grading appliances until recently. However, now that the tractor has become common, heavier equipment is being manufactured. For instance, the Schmeiser Manufacturing Co., of Davis, and the Holt Manufacturing Co., of Stockton, have built up a considerable business in land-levelers operating on somewhat the same principle as the fresno scraper, but of much larger capacity. Special V-plows for making small surface ditches are made

SUBSOILER DRAWN BY TRACTOR

Holt Manufacturing Co.

by several firms, and the Killefer Manufacturing Co. of Los Angeles makes a 'gopher-plow' that excavates a circular drainage-channel beneath the surface like a gopher-hole, which in certain soils, remains open for a considerable time.

Clearing land for cultivation frequently requires similar machinery to that used in logging operations, although usually of a smaller size. The farmer is the principal purchaser of stump-pullers. A special type of land-clearing equipment recently developed is a device equipped with cutting blades to be hauled by a tractor and to cut sage-brush just below the ground.

Harvesting machinery in general has been standardized for many years, and the American product is known

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TRACTOR AND PLOWS TURNING CORNER
Advance Rumely Thresher Co., Inc.

all over the world. The equipment used for wheat and barley can be adapted easily to Egyptian corn, beans, alfalfa seed, and many other products. In the case of rice, however, which has only recently become an important crop, the adaptation has not been entirely successful, and there is need for a harvester designed to meet the special conditions of the rice-fields.

Until a generation or two ago, the muscle of men and animals was the only available power for farm work. The steam traction-engine was introduced in the latter part of the last century, and is still used to some extent. Even for the larger sizes, however, it has, for various reasons, been practically displaced by the internal-combustion engine. The development of the special traction device that gained prominence on the 'tanks' has widened the field of the tractor. However, it is unwise to assume that animal-power is shortly to become a back-number on the farm. The latest available census returns give 24,000,000 horses and mules in the United States, of which at least four-fifths, or 19,200,000 are work stock. During 1917, 45,000 tractors were sold to farmers in the United States. At the liberal estimate of five animals displaced by one tractor, this corresponds to a little over 1% of the total number. It will evidently be several years before the possible market for tractors will be satisfied.

An interesting recent development of the tractor industry is the possibility of increased speed of operation. The earlier tractors, being built to compete with animals, were designed to operate at the average walking-speed of a horse pulling a plow, from 2 to 2½ miles per hour. However, since the drawbar pull of a tractor varies with the weight of the machine, there is no object in increasing the size of the engine beyond a certain point, unless the speed can be increased above the customary 2½ miles per hour. Experiments now being conducted by J. B. Davidson, professor of agricultural engineering at the University Farm at Davis, California, indicate that the economical speed for which tractors should be designed is considerably more than the present standard, and that therefore the capacity of a tractor of a given size in acres cultivated per day can be considerably increased with resulting economy in food production. 'Size' is here used in the sense of space actually occupied, not of horse-power.

Tractors are made in all sizes from ½ hp. to 75 hp. Unfortunately, no standard rating has been universally adopted so that exact comparisons between the various machines is not possible. Generally the larger sizes are for grain and the smaller for orchard and truck crops. The advantage that a tractor has over animal-power is that it permits a man to direct a greater horse-power. Consequently, other conditions being equal, the most economical tractor for a given kind of work is the largest that can conveniently be used for that work. Special considerations, particularly interest and depreciation charges, may affect this, but the saving of, say, 30 days of a man's time in the course of a year by doubling capacity will pay interest on a considerable investment.

The two most important crops in the United States, corn and cotton, as well as many others, are planted in rows and 'inter-tilled'. Consequently, the tractor that, by 'straddling' the rows, can do this class of work, is the one that ultimately is going to have the greatest number of sales.

The 'service-man' for a tractor agency in California usually has an easier time than in other States. This is partly because the weather during the time when tractors are used is not so cold, but mainly because engine distillate is the principal fuel, rather than kerosene. The result is less trouble with starting and with the carbureter in general. Kerosene is, however, used to a considerable extent, and several of the tractor companies are now making experiments with a hot-bulb heavy-oil engine.

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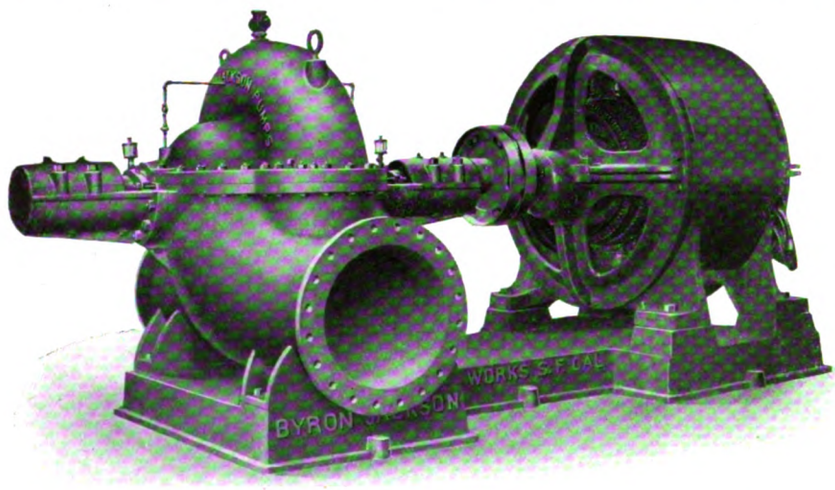
AMERICAN HARVESTING MACHINERY IS KNOWN ALL OVER THE WORLD
Holt Manufacturing Co.

An interesting series of experiments was made at the University Farm at Davis about a year ago with a 'home-made' electric tractor by Mr. Davidson and F. E. Boyd, of the General Electric Co. These experiments were carried far enough to indicate that a practicable electric tractor could be developed for use where electric power is available.

Until power-lines began to be constructed through the farming districts, the only stationary prime-mover of importance for farm-work was the gasoline-engine, and the farmer still is, and probably will continue to be, the largest purchaser of the small internal-combustion engine. Where electric power is available, however, the smaller amount of attention required for an electric motor is usually the deciding factor. It is estimated that, considering motors under 50-hp. alone, 400,000 electric horse-power is now installed on the farms of California, and that $9,000,000 worth of electrical apparatus is sold per year. The estimate of horse-power does not include the many motors exceeding 50 hp. capacity that are in use in the larger irrigation and drainage systems. A number of hot-bulb heavy-oil engines have been sold to farmers and give satisfactory results.

Agriculture, like any other industry, is using an increasing number of motor trucks every year, but the service required from the trucks does not differ from that required in other industries, so there has been no reason to vary the standard designs. The farming industry also provides a large market for automobiles. For the farmer, the term 'pleasure-car', is more of a misnomer than for almost anyone else. He undoubtedly gets lots of pleasure out of his car, but he expects it to do a great deal of work besides. At this moment there are probably few forms of farm-work, from pumping the domestic water supply to smoking out gophers with the exhaust, that some 'flivver' is not patiently doing. Consequently, attachments of all kinds that will enable the farmer to put his car at some new job find a ready sale. The fact that most of the automobiles on the farms belong to one well-known type simplifies the manufacture of such attachments.



CENTRIFUGAL PUMPS ARE ALMOST UNIVERSALLY USED WHERE THE SUCTION-HEAD IS SMALL
Byron Jackson Iron Works

In 1910 there were over 10,000 pumping-wells used for irrigation in California, besides many others that were used for domestic and stock-water only. The number is much greater now. Where the suction-head is small, so that the pump can be placed at or near the water-level, the centrifugal pump is almost universally used. For deeper wells the choice lies between turbine and plunger pumps, with the proportion of turbine pumps probably increasing. It is unfortunate that the installation of many farm pumping-plants has been done under the direction of the proprietor of the local hardware store, who might be, but probably was not, an expert pump engineer. The result has been low efficiencies, for even when the work was properly

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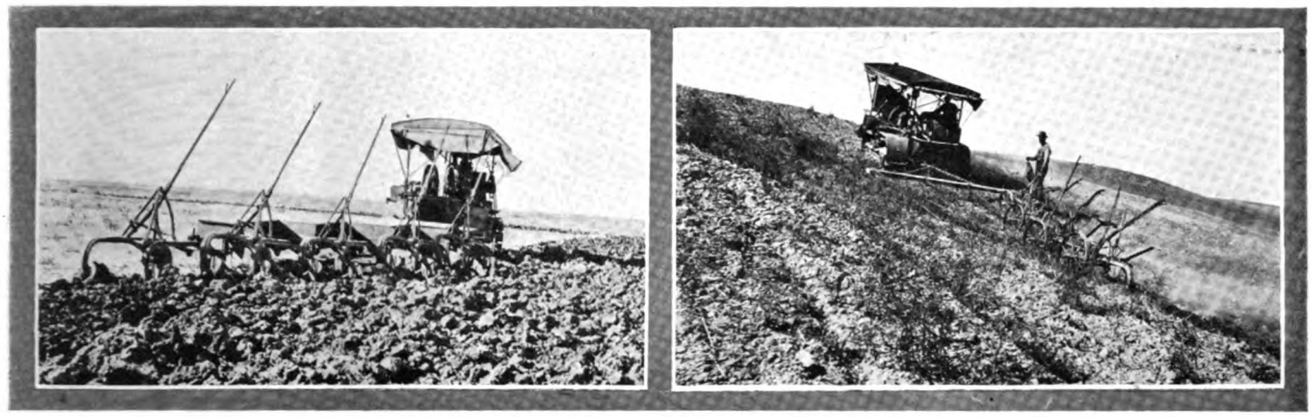

PLOWING WITH TRACTORS
Holt Manufacturing Co.

done in the first place, the plant has been allowed to run down for lack of care. These conditions have a good deal to do with the bad reputation of pump irrigation in many localities.

The class of equipment including cream-separators, feed-cutters, corn-shellers, and similar machines might be grouped under the name of barn-machinery. Such machines used to be operated by hand, or occasionally by animal power, but at the present time many even of the smaller sizes are run by gasoline engine or electric motor. Milking-machines furnish an example of some of the special conditions that the designer and seller of farm-machinery has to consider. Wherever the operators have been trained to use them properly, the results have been entirely satisfactory. However, the class of labor that is usually employed in milking, is hard to train to operate machinery, and unskilful use of a milking-machine may terminate a cow's milk-producing career. For the small dairyman, who does most of his own work, or for the man that happens to be particularly fortunate in his labor-supply, milking-machines give good service, but it looks as if their general adoption might have to wait for the development of a new breed of dairy worker.

Similar to barn-machinery are the electric-lighting plants run by internal-combustion engines that have been introduced in recent years for farms where central-station power is not available. As far as the general run of machinery and metal equipment for residences is concerned, the average farmer is prosperous enough to buy as much if not more than the average city man.

A large amount of metal equipment of all kinds, other than machinery and implements, is used on the farm, but much use is still made of other materials, where metal would be both more durable and more convenient. Wire fencing has practically supplanted any other type, and many ingenious designs have been made to prevent domestic animals from getting out, and other animals, and man, from entering. Iron tanks, culverts, and irrigation head-gates are usually more serviceable than those of other materials. To those whose ideas of a stable or dairy are based on that visit to grandfather's in '92, a modern farm would prove a revelation. Metal troughs, stanchions, feed-racks, mangers, and ventilators are only part of the equipment that the up-to-date farmer uses.

While it is entirely possible for a farmer to load himself up with so much machinery that interest and depreciation charges eat up his profits, the average farm on the Pacific Coast as elsewhere is still under-equipped for the most efficient production, and the market for agricultural equipment presents many possibilities for profitable trade.

An elderly man was traveling on a southern train when he became engaged in conversation with a younger man in the seat beside him. Eventually the talk led to personal experiences.

"Once I was a clerk in a grocery store at $10 a week," said the younger man, speaking of his earlier life, "but, like many others, I fell in with careless companions and was induced to gamble—"

"I see! I see!" interjected the elderly one, with a sigh. "You gambled and was tempted to take money that did not belong to you."

"Oh, no," was the cheerful rejoinder of the younger man. "I won enough in a month to buy the grocery store."—'Philadelphia Telegram'.

"Private Blank," said the Colonel severely, reprimanding a doughboy for a minor breach of military regulations, "what would you do if I should tell you that you were to be shot at sunrise?"

"Gosh, Colonel," replied the Yank, "I'd sure pray for a cloudy day."

He was one of those young men who never seem to know when to go home. She had tried yawning, but even that failed to get rid of him.

Presently a clock began to strike twelve.

"Oh, I say, Miss Green," said the late stayer, brightly, "is that an eight-day clock?"

Miss Green smiled coldly at him.

"Well," she said, stifling another yawn, "why don't you stay a little longer and find out?"

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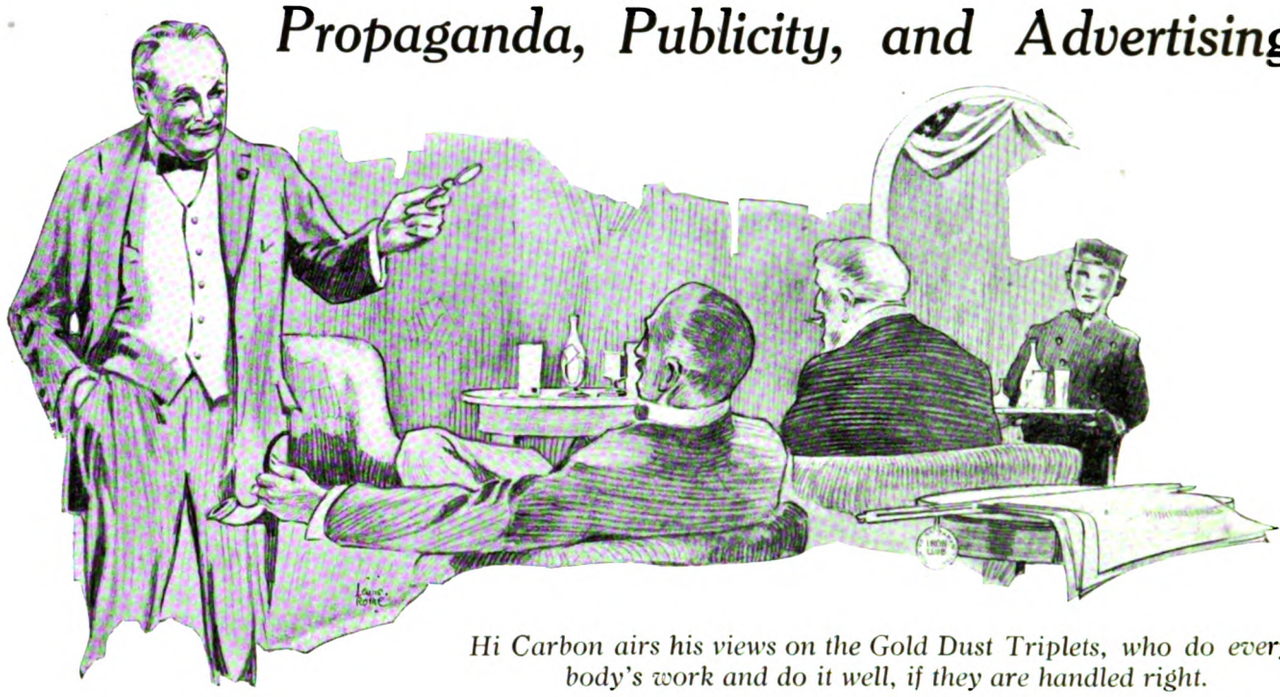
Propaganda, Publicity, and Advertising



Hi Carbon airs his views on the Gold Dust Triplets, who do everybody's work and do it well, if they are handled right.

"THIS War has certainly given us a lot of new words," said Pettigrew as he drew his chair into the circle with his cronies, Smithers and Hi Carbon. "We talk about camouflage, avions, liaison, and all sorts of other things just as glibly as if they had been a part of our everyday existence for years."

"That's true," replied Smithers, "I suppose because the principal theatre of war was in France, we have adopted the French nomenclature and grafted it bodily into our own language, just as we did in the case of the automobile."

"There is one other word you have left out, a perfectly good English word too, in spite of its obvious Latin derivation. To me it spells one of the most potent and insidious forces we have had to fight against," interjected Hi, "And that word is propaganda." German propaganda wrecked Russia, it almost wrecked Italy, it came perilously close to effecting a split among the Allies, and it kept us from doing our own bit for a long time after the Lusitania was sunk. Propaganda is one of the world's great weapons, not merely for the prosecution of war but for the peaceful pursuits of business. In fact, propaganda is never-ending; it works nights and Sundays; it has no hours and never takes a Saturday afternoon off. It is used for destruction as well as construction, and we are just beginning to appreciate what it really signifies."

"That's true," replied Smithers. 'Stories have commenced to come out, now that the censorship has been removed, showing what an absolutely conscienceless bunch the Germans have been and are. When decent people go up against a whole nation that is utterly lacking in principle, it takes a long time to get organized to fight them with their own weapons. But I don't see quite where this propaganda stuff has anything to do with business."

"Perhaps if you changed the word propaganda to publicity, or its twin sister, advertising, you would see it more clearly," said Hi. "Propaganda, publicity, or advertising, whatever you are minded to call it, is the fuel that moves the business engine as well as the war engine. Take advertising for example. It has become a science, and advertising, in a modern sense as applied to business, was born in America. There is hardly a conspicuous business success in the United States today that was not created by advertising."

"Even so," returned Pettigrew, "I think that a great deal of it is overdone. These bill posters that disfigure the landscape make me tired. It is disgusting to think that one can't go for a motor ride anywhere without being confronted by somebody's pink pills or genuine alfalfa breakfast food or something."

"Well," philosophized Hi, "Don't forget that it takes all kinds to make a world. The advertising man who is handling the pink-pill propaganda knows that too. His job is to sell pink pills to the world. He wants to reach all the people somehow, and therefore he takes steps to send his appeals through every possible medium, couched in every possible phraseology, so that, between them all, everybody there is, from the janitor's wife to the queen of the four hundred, will have pink pills, pink pills, and more pink pills hammered at her so hard that she actually won't be able to rest until she has a box of those self-same pills in her vanity case, or wherever it is that they carry them."

Hi paused to catch his breath. "Pursuing this subject further," he continued, " the really skilful advertising man divides the human race into a great number of strata. If the article he wants to sell is something of gen-

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eral appeal to everybody, he must use every possible means of reaching all the people, within the limits of his advertising appropriation. He tackles the lady of the house through the women's papers, the men through the men's papers, and then takes a flock shot at everyone through the few great national publications that are read universally by both sexes and by people in a wide variety of stations in life. The daily papers come in for a share, also country weeklies circulating in agricultural districts. Then, for the people who don't read much of anything, and unfortunately there are such, the bill posters go after them in such aggressive, blatant style, that pretty soon, those self-same pink pills really do become a household word and the manufacturer begins to cash in."

"It seems to me that what a man needs to go into business nowadays is all the money in the world plus ten per cent for luck," commented Pettigrew. "That advertising scheme must cost a mint of money if carried to any such extent as you describe, Hi," he continued. "Wouldn't it be good sense for Mr. Pink-Pill Man to put some good salesmen on the road and call on the trade in the usual way and get the druggists, for instance, to talk them up to their customers? This wouldn't cost more than a hundredth of the advertising scheme, and it ought to work, at least it used to work."

"True," answered Hi, "It used to work, when this country only had about half its present population, and everything was cheap, transportation, wages, and all the other things. The thing that brought advertising into its present commanding position was the ever-growing necessity for saving money, not spending money. The most expensive single way to sell goods is through personal salesmen. Sending a lot of men out broadcast is like taking a flock shot at the sky with both eyes shut and expecting to bring down a duck. You might get a duck, but the odds are a thousand to one you won't. Instead of that, the market-hunter baits a pond, he fills it with decoys, and brings the ducks right to him, within range of his gun. Think how much cheaper it is to inspire people with a belief in your product, and a desire to have it *before* your salesman arrives on the scene! The goods are more than half sold before the personal salesman begins to work at all. Even more than that, through the interest excited in your goods, and the inquiries started through your advertising, your salesman goes straight to the prospects, instead of combing the whole country from end to end."

"Yes indeed," continued Hi, "advertising is the greatest money-saver, the greatest cost-cutter in the world. How do you figure your costs, anyway? There is so much for labor, so much for material, and so much for overhead. So far, so good. If you could double your sales, how would that affect your costs, and consequently your profits? Your labor would be lower per unit, your material would be lower per unit, and your overhead would be lower per unit; every single item of cost would be reduced. Why? Take labor. You would not spend any less time rigging up for one piece than for one hundred. Again, with one hundred pieces to make, your man would work faster and turn them out quicker because, through practice, he could work better and with less fatigue to himself. Take material. Suppose you bought your materials by the carload instead of by the ton. You would get better prices, and not alone on that account, but also by being assured of a greater volume of trade, you could probably contract for a year's supply at one time, and thus get even better prices. Then comes our old friend, mister overhead. You could undoubtedly double your present output without any increase at all in rent, insurance, superintendence, accounting, selling, or of any of the items that make up your overhead burden. You see how imperative it is to go after volume of trade, and advertising is absolutely the only sane, rational, effective way by which volume of trade can be produced at a cost that is within reason."

A silence fell over the trio for as much as a minute.

"Hi," said Smithers, slowly, "All this talk seems to spell just one thing, and that is money, money in gobs and chunks, money without limit, which has to be spent like a drunken sailor, and you never know until after most if not all of your money is gone whether the enterprise is going to be a success or not."

"It does take money," replied Hi, "that is, some money. The amount depends entirely upon what you want to sell, and to whom you want to sell it. If it is a new chewing gum, or breakfast food, or a safety razor, why you will have to get in and dig up hundreds of thousands every year, if not millions. If, on the other hand, you are selling engineering apparatus, machinery, or any specialized commodity which appeals to a certain specific class of people, it is another story altogether."

"Just where does the difference come in, Hi," asked Pettigrew. "It seems to me that the principle is just the same in either case."

"The principle is the same," replied Hi, "but, in a sense, the application is different. To go into the question more specifically, you may know that there are published in this country, and, to a more limited extent in other countries, what are known as class papers. I use the word class, not in the slang-of-the-street sense of the word, but meaning papers that cater exclusively to a specific class of people. There is at least one, or more publications printed and edited for every conceivable occupation or industry. This applies to all branches of engineering, manufacturing, and what not, from moving pictures to economic geology, from women's ready-to-wear clothing to metallurgical chemistry. There are literally hundreds of such publications, and they have the greatest educational value, and, in consequence, the greatest commercial possibilities from the standpoint of the advertiser that has something for sale to the industry reached by the paper or papers. Such papers are little known outside of their own field but wield a tremendous influence within their field nevertheless. It may be taken as an axiom that whatever else a man may do, he will read a daily paper and the class paper catering to the industry or pursuit in which he, himself, is engaged. The obvious course to pursue, then, if you want to sell any-

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thing to a particular class of men for use in a certain industry, is to look up the paper or papers catering to that specific industry and go after it. This kind of advertising is the best-paying and consequently the cheapest kind there is. Of course, your chewing-gum man, or your talcum-powder man wouldn't attempt to advertise in an engineering paper, and the publishers wouldn't accept his business if he offered it to them. On the other hand, a man would be equally silly if he advertised engineering apparatus in a pictorial magazine, although it is true that some of them are trying it, and thereby getting rid of some of their surplus money."

"To go on with this subject a little further," continued Hi, "Think what a cinch it would be to you, for instance, if by some trick of legerdemain, all of the people who constitute the potential market for your goods could be herded into a corral within easy access of your shop, and would convene once a week, or month, as the case might be, and listen patiently while you expounded the virtues of your stuff, and not merely listen once, but would listen to you again and again at regular intervals. And, suppose again, that all it would cost you to talk to them was about a cent or so each."

Smithers and Pettigrew both laughed. It was too much. "Roll over, Hi," said Pettigrew, finally, "You are on your back and snoring your head off. The next thing you know, you will have all these prospective customers sitting up on their hind legs and eating out of my hand."

Hi laughed too. He couldn't help himself. "Perhaps the poetry of my metaphor is a little too much for you fellows. You ought to cultivate a little imagination. But nevertheless, that is what the class publications do for their advertisers, just that. They spend a mint of money, and many years of hard patient effort in creating a publication that will be of interest and value to those engaged in a certain industry. They come to you and submit the most detailed statistics not merely of the industry they cover, but of the individuals who read their paper. You can tell, for instance, that with the XYZ engineering monthly, they have so many paid subscribers consisting of certain numbers of engineers, managers, superintendents, purchasing agents, and what not within their field. Here you have a definite statement of just what your audience will consist. Not only that, but there is an independent auditing association that makes regular audits of circulation and verifies all circulation statements. You see, class publications, that is most of them, have long since passed the hot-air stage in their careers and are conducted as a highly skilled business strictly on business lines. When you buy advertising space nowadays, you can know just what you are getting, just whom you will reach, and how many of them. Again, you can get the geographical distribution of circulation, and see how many readers of the paper in question are within the territory you can reach."

"Really your surprise me, Hi," said Smithers, "I had no idea that any such development had taken place. I have been so busy during the last few years on war work, that my problem was one of production, not marketing. Now that we fellows will all have to get out and hustle again before long, what you say merits serious attention."

"You will certainly have to get busy before long," replied Hi. "If you fellows would only travel around more you would get a much better perspective on methods of trade propaganda and business-getting in general. The larger concerns, who spend millions annually on such work, have highly organized publicity departments in charge of experts of various kinds. In addition to a general manager of publicity, there are experts in charge of each sub-department, such as the copy department, catalogue and circular department, another department that prepares publicity matter such as announcements of new apparatus, performance of apparatus in the field, news of new contracts and orders, and all sorts of other activities, all in the direction of making the manufacturer and his product better and better known everywhere."

"Do those fellows publish news of new contracts, Hi?" asked Pettigrew. "It seems to me that is a foolish thing to do. All their competitors will know who their customers are and go after them."

"I see your mind is still rambling around in the Dark Ages of business, Pettigrew," answered Hi. "That idea about giving news to your competitor is all bunk. In the first place, your competitor knows just as soon as you do whenever you get an order, for the simple reason that he has probably figured on it himself. If he hasn't, somebody else tells him. Anyway, it is just like all the secrecy about the shipment of our troops to France. The only ones who didn't know when they went were the American people. The Germans knew, because they made it their business to find out, and they found a way somehow of getting the dope pretty straight, too. On the other hand, what could be a better advertisement for you than the news of your receipt of a good fat contract? It conveys an idea of your prosperity, that you have gained the confidence of somebody to the extent of being entrusted with the execution of a sizable job, and with it the natural implication that you are competent to fill it. Don't make any mistake about it, the world loves prosperity; it will flock to the man who is prosperous, in other words who is a success. When you want a doctor, do you hunt around for some obscure practitioner? Not much. You pick out the best-known man you can find. How has he become 'best-known'? Advertising, word-of-mouth, of course. He lets it be known that he has performed a delicate operation on somebody, that he has pulled somebody else out of a critical illness, and so it goes. Before long, that doctor has more work than he can handle."

"You are something of a doctor yourself, Hi," this from Smithers, who had been listening attentively. "You are performing an operation on lots of my old prejudices. I can see that there is probably some real merit in what you say. Anyway, I will think it over. It looks as if I would have to go at it in a different way."

"Quitting time, boys," said Hi, rising from his chair. "See you again soon."

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Industrial Reconstruction of Northern France

THE following data are abstracted from a report prepared for the Bureau of Foreign and Domestic Commerce of the U. S. Department of Commerce by Pierce C. Williams, commercial attache at Paris.

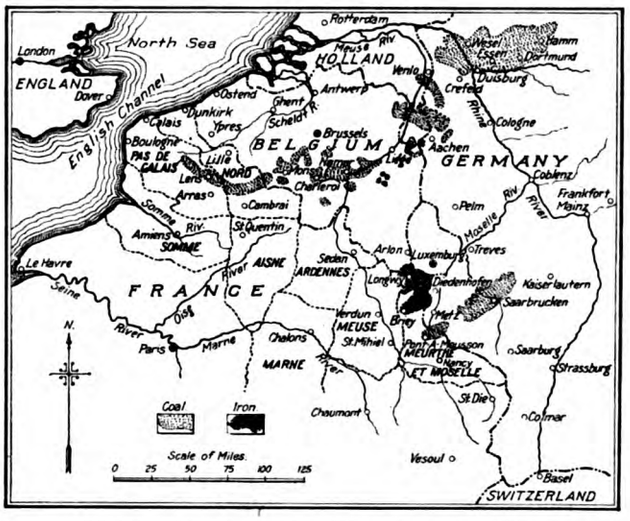
Department of Nord

This department includes some of the most important industrial regions of France. At the time of the battle of the Marne in September 1914, the German forces almost reached Hazebrouck, only a few miles from the coast. Later, however, the line of battle became stationary farther to the east along the line of Arras-La Bassee-Armentieres-Ypres. All of the department east of this line remained in the possession of the Germans until September 1918, and, during the German drive of the spring of 1918, the zone of destruction was extended as far west as Hazebrouck. There is therefore a strip of territory that was fought over for four years, with consequent destruction to property from shell-fire and the normal incidents of war. In addition back of the old battle-line, there is a much larger and more important industrial region, which, while it has not been seriously damaged by shell-fire, has suffered at the hands of the German military forces.

The department includes the former province of French Flanders. It is 125 miles long and from 3 to 40 miles wide. The total area is 2225 miles, four-fifths of which is cultivated. Weaving, mining, and steel-making are the principal industries. The collieries alone employ 17,000 men, although the department consumes 50% more coal than it produces. The total population in 1906 was 1,896,000, and the population of Lille, the chief city was 216,000.

The horse-power employed in manufacturing in 1913 was estimated at 500,000, 90% of which was used in the region until recently in German occupation. Out of a yearly production of 40,000,000 tons of coal from all of France, the department of Nord produced in 1913 nearly 7,000,000 tons. The coal mines of this department are part of the same basin that underlies Pas-de-Calais. Together these departments produced 27,000,000 tons of coal in a normal year before the War. The damage done to coal mines in the north of France is almost incalculable.

The department was also an important iron and steel making section. The total pig-iron production in France before the War was a little over 5,000,000 tons. Of this quantity, Nord produced 556,000 tons. This iron was smelted in 12 blast-furnaces, the majority of which were in the invaded portion of the department. Besides these blast-furnaces, the department possessed 16 acid and basic converters, and 33 Siemens-Martins furnaces, practically all of which were in the occupied territory. These steel works before the War produced 850,000 tons of ingots and rolled 808,000 tons of finished steel, chiefly merchant bars, plates, and rails. They have suffered almost irreparable injury. In this department were also many factories turning out a great variety of iron and steel articles. These ranged all the way from pins, nails, and horseshoes up to steam turbines, locomotives, and electrical generators. Much of the equipment of these work-shops, such as the cranes, leather belting, electric



MAP OF BELGIUM AND NORTHERN FRANCE

cables, and all metal parts, was carried into Germany. It will require months, and in some cases years, to put these works in position to resume manufacturing.

The textile industry of the department of Nord constituted one of the most valuable elements in the national wealth of France. Lille and its suburbs, with Roubaix, Tourcoing, and Cambrai, were the important centres for spinning and weaving cotton, wool, and linen. Valenciennes was noted for the quantity of machine-made laces it produced. Nearly 200,000 persons were employed in the textile industries of this one department. The cost of the machinery and raw materials needed to restore these industries will run into many millions of dollars. In addition to the damage done to industrial plants, there is the damage to houses, public buildings, railway stations, bridges, and public services generally.

The French government has authorized a co-operative society known as the *Comptoir central d'achats industriels pour les régions envahies* (with head office at 40

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Rue du Colisée, Paris) to act as purchaser and distributor of materials and equipment needed for the reconstruction of the damaged industries of France.

Department of Pas De Calais

The entire eastern half of this department was covered by the high tide of German invasion in September 1914. Comparatively little damage to industrial establishments was done at that time. Later the front became fairly stationary along a line through La Bassee, Lens, and Arras. The eastern part of the department including the coal district at Lens was under bombardment from both sides. Last March the German drive toward Calais extended the zone of destruction westward to other coal mines near Bethune. The restoration of these mines comprises perhaps the most difficult part of the entire task of industrial reconstruction in France.

The department corresponds roughly to the old province of Artois. The area is 2573 square miles, nearly all of which is under cultivation. The population in 1906 was 1,012,466. The population of Arras, the largest city, was 25,000. Coal was discovered in 1847 when boring a water-well. The nine blast-furnaces of the department produced in 1912, 250,000 tons of pig-iron; the steelworks, consisting of five converters and four Siemens-Martin furnaces, produced 150,000 tons of steel ingots. In addition, 118,000 tons of rails and merchant bars was rolled. These installations, however, were not in the invaded region.

The most important industry of Pas de Calais is coal mining. Of the 40,000,000 tons of coal mined in all of France in 1913, the department produced almost half. The production lost to France through the occupation of certain mines by the German forces or because of their location in the zone of fire amounted to 16,000,000 tons. This loss was about equally divided between the two departments of Nord and Pas de Calais. Some idea of the damage that has been done to the coal mines in these two departments may be obtained from a statement given out in the latter part of October by the French Ministry of the Liberated Regions:

"A commission arrived yesterday at Lens to examine the condition of the city and the mining installation. They visited the communes of Lens, Sallaumines, and Lievin. Of the 10,000 houses which Lens possessed, there is not one that is still standing. Everything is razed to the ground. With respect to the mines themselves, they are flooded. At the mines of Courrieres, which have just been freed, the Germans before their departure blew up all the surface installation, which was considerable."

In restoring the damaged coal mines of the departments of Nord and Pas de Calais, first of all the water, which the Germans permitted to pour into the mines by dynamiting the concrete lining of the shafts, must be pumped out. After that is done, the underground galleries must be cleaned out and re-timbered. At the same time, the surface equipment, such as the hoisting apparatus, electrical generating stations, and boilers, must be renewed.

Department of Aisne

Aisne has been the scene of some of the most desperate fighting of the War; consequently the department has suffered great damage. It was at the extreme southern end that American troops stopped the German advance toward Paris in July of last year, and their pursuit of the enemy carried them northward over almost one-fourth of its length.

Aisne abounds in names that the War has made known in every quarter of the earth. Chateau-Thierry, Senlis, Soissons, the Marne, the Aisne, the Chemin des Dames, Laon, St. Quentin—all these are the names of towns, rivers, or roads in this department. They are associated with great Allied victories, but they are also significant of destruction that will require years of patient toil to restore. The western border of the department suffered great damage during the fighting that occurred in the spring and summer of 1917.

Of the 45,000 hp. used in the department of Aisne, four-fifths is estimated to have been in factories in the part that was in German occupation. The sugar refineries, of which there were over 80, employing nearly 15,000 people, have been severely damaged, and their restoration will be a serious problem. A French sugar refiner who visited Laon gave the following information to the Paris papers:

"With respect to the sugar refineries, they were given up, generally speaking, to complete destruction. All sugar mills in the district of Laon have been stripped of their equipment. At Crepy-en-Laonnais, which is still intact, the installation in the sugar refinery has been carried off. The structures had even been mined, but orders were given by the Germans before their departure not to blow them up. Doubtless this was because of the Allied warning to them."

St. Quentin was an important industrial centre, not only of the department of Aisne but of France as well. The textile industry included numerous mills for combing and carding wool, for spinning cotton, and for the manufacture of embroideries. Some idea of the destruction wrought by the Germans in the textile factories is given in the following extract from a statement recently published by the municipality of St. Quentin:

"In each factory the spectacle is the same. Either the destruction is complete or else the walls remain standing, but with the looms smashed to pieces. Outside are piles of scrap iron, ready to be carried off into Germany."

Besides this destruction of industrial plants, hundreds of villages are in ruins; railways, roads, and canals are badly damaged. The amount of material needed to restore the economic life of the department of Aisne can hardly be estimated.

Department of Marne

This department lies due east of Paris. It is bounded on the west by the department of Aisne, on the north by the department of Ardennes, and on the east by the department of Meuse. Its chief centres are Rheims, St. Menehould, Epernay, Chalons-sur-Marne, and Vitry-le-

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Francois. The southern border of the department of Marne marks the limit of the German advance. When the battle of the Marne began, on September 5, 1914, the line of battle formed a semicircle, the eastern end of which rested on Verdun. An arc of this semicircle included nearly all of the department of Marne. For several days practically the entire department was in the occupation of the Germans. By September 12, however, the German front had been thrown back along the line running from Verdun on the east to Rheims on the west. Because of the rapidity of movement at the battle of the Marne, the amount of destruction in this department was not, comparatively speaking, great.

With some fluctuation, the front remained stationary along the line Verdun-Rheims for over three years, and only a narrow fringe along the northern frontier of the department remained in German occupation. This strip suffered considerable damage by reason of the desperate fighting which took place on it. A zone back of the battle line varying in depth suffered damage from German shell-fire and aerial bombardment. The town of Rheims has been the chief sufferer. The destruction to houses, public buildings, and industrial plants in the city and its environs is enormous.

Department of Ardennes

The department of Ardennes, lying north of the department of Marne and forming part of France's northern frontier with Belgium, was entirely in German occupation from the beginning of the War until the start of the German retreat a few weeks ago. As these lines are written (November 5, 1918) the southern half of the department has been liberated. Until the department is fully liberated it is difficult to gain any exact idea of the extent to which houses, public buildings, bridges, and industrial plants have suffered. The department of Ardennes is largely forest land, but it includes several important centres, such as Rocroi, Mezieres, Sedan, Rethel, and Vouziers.

Department of Meuse

The department of Meuse adjoins the departments of Marne and Ardennes on their eastern sides; on the north it touches Belgium for a short distance; on the east it adjoins the department of Meurthe-et-Moselle. Verdun is almost in the centre of the department, and the area of German invasion is the region north of that famous place. Until the victorious advance of the American Army in the St. Mihiel salient last September a considerable territory belonging to the department of Meuse east of Verdun was also in German occupation. On November 5, 1918, about one-third of this department was still in the occupation of the enemy troops. The region north of Verdun is largely forest land, and the only important town is Montmedy. At this moment it is impossible to estimate the damage, but it is probably not great.

Department of Meurthe-et-Moselle

The capitulation of Germany found its armies still in occupation of an important part of the department of Meurthe-et-Moselle. This territory contains the Briey mining basin, the richest iron-ore deposit in France, and, at the outbreak of the War, produced most of the yearly output.

In the part of the department invaded by the Germans at the beginning of the War were numerous iron mines, more than 80 blast-furnaces, and many large steel-works. The iron mines nearest Luxembourg were in some cases kept in operation by the Germans, and it is believed they have not suffered serious damage. The mines near the western border of Meurthe-et-Moselle were closer to actual fighting and consequently suffered greater damage. This was due principally to flooding by reason of the stoppage of the mine pumps. Blast-furnaces and steel works in the region of Pont-à-Mousson were actually in the zone of battle and were severely damaged by shell-fire. Other works inside the German lines were systematically stripped of their equipment. At this moment it is impossible to give any accurate information as to the extent of the damage suffered by the iron and steel industry in Meurthe-et-Moselle. In the best of circumstances the cost of restoration will be many million dollars.

The following figures give some idea of the importance of the department of Meurthe-et-Moselle in metallurgy:

Iron ore: Total production of France (1913), 21,714,000 tons. Production of Meurthe-et-Moselle, 19,813,000 tons, of which 16,009,000 tons were produced in the Briey basin, which was occupied by the Germans.

Pig-iron: Total production of France (1913), 5,311,000 tons. Production of Meurthe-et-Moselle, 3,403,000 tons.

Steel ingots: Total production of France (1912), 4,428,000 tons. Production of Meurthe-et-Moselle, 2,195,000 tons.

Rolled-steel products: Total production of France (1912), 3,250,000 tons. Production of Meurthe-et-Moselle, 1,135,000 tons.

"We had to stop our little girl answering the front-door bell."

"Why?"

"The other day when Ensign Jones came to call on our eldest daughter he was dressed in his white uniform, and when the little one opened the door and saw him she immediately called up stairs: "Ma, how much bread do you want today?"

"And what is your name, little boy?" beamed the kindergartner upon a new pupil, who stood bashfully before that personage's imposing figure.

"I don't know!"

"Come, come! What does your mother call you when the cakes are done?"

The pupil replied, brightening up:

"She don't call me then! I'm there!"

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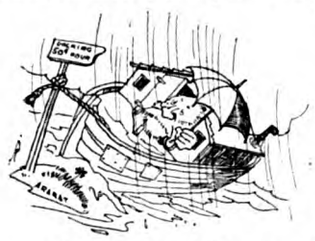
By The Editor

WHEN Eve disposed of the apple to Adam, she qualified as the first salesman, or perhaps, saleslady would be better. Indeed, the apple proved to have been a lemon, as the ills to which all flesh has been heir ever since will bear abundant testimony. The serpent was the first advertising man, whose full-cap headlines and masterful composition so forcibly sold the apple idea to Eve, and then to Adam, that selling, with all its ramifications, lights, and shades has been an inseparable part of our scheme of existence ever since.

From then on, through the time when Noah was compelled to tie up at Ararat on account of tire troubles, the science of salesmanship grew and grew. The first expense account for entertaining is found in the sad case of Esau, who sold his birthright for a mess of pottage. This handy adjunct to salesmanship, the psychology of the full stomach as a first-aid to the persuasiveness of the glib-tongued salesman, is just as much a part of the game as the wise old serpent of advertising and the sales talk of Eve.

From the sonorous tomes of the Old Testament to the slang of the cities, at heart it is the same old story repeated in never-ending variety and cadence. The men who go out on the job with quips, knights of the grip-sack, armed cap-a-pie with price-book, order-blanks, and a pocket full of cigars, move the output of the world of factory and farm, and do it well.



The drummer, in the eyes of those who know not, lives a charmed life. He is a hail-fellow—well-met with everybody. He fairly exudes optimism and good nature. His pockets are always full of cigars—good ones too—and his first words are, "What are you going to take?" He travels everywhere, knows everything, and, rumor has it, all expenses are paid, actually PAID, and gladly, by a complaisant boss, who loves his little drummer, and cares for him as he would a rare exotic in the conservatory of hired men. This genial, rather stout, red-faced young man, in clothes like the collar 'ad' in the magazines, is the favorite of the gods, and takes off his hat to no man. "What a cinch!" thinks Rollo, the high-school freshman, who then and there decides that, come what may, he will be a salesman when he grows to man's estate.

There are salesmen and salesmen. There is the vendor of peanuts on the street corner, whose plaintive piping steam-whistle is as significant of his calling as the striped pole that proclaims the barber. The beautifully tailored exquisite with the air of Lord Cholmondeley, who, with raised eyebrows expresses his contempt when you inquire for the fifty-cent counter at the fashionable jewelers, and the man who barks "Where to," when you approach the ticket-window at the railroad depot, all seem, in a way, to absorb a certain atmosphere from the nature of their calling. Their varying attitudes toward those they serve, from haughty disdain to servile adulation, are an index to the amount of competition they must face.

These are all salesmen, so called, but really, salesmen for such worthies is a gross libel upon an honorable and intricate calling. They are order-takers, not order-getters, and there is a vast difference between the two. Again, there is the new profession, that of sales-engineering, wherein the sales engineer is a creator, a builder, and must have, not only a highly trained technical and commercial brain, but the sales temperament as well, a quality as rare as that of music, art, or any of the other gifts not to be acquired from books.

Each particular kind of selling is a specialty in itself. The successful vendor of delicatessen would not make much of a job at selling ball-mills to a copper mine, and vice versa. However, it is not with delicatessen, ready-to-wear garments, or breakfast food that this article will deal. Let us talk of something of which we know, the mining machinery salesman. Solomon, with all his wives, had no problems such as his.

There is no fixed method by which the ability of any

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salesman may be determined before a trial, nor is there any physical peculiarity by which any man may be said to be, literally, a born salesman. There are almost as many types as men. There are fat ones and lean ones, loquacious ones and monosyllabic ones. Some achieve such sartorial eminence as to be worthy of the appellation, 'swell dressers', while others are downright shabby, and neglect the occasional shoe-shine and haircut. Nevertheless, in each, somewhere, there is that indefinable something that produces the signature on the dotted line.

Employment managers, psychologists, phrenologists, and other intellectual highlights have promulgated innumerable fads and fancies whereby the round and square pegs may be classified and placed in exactly the kind of holes for which they are temperamentally fitted, but none of these handy formulas for the solution of the human equation amount to much where the selection of salesmen is concerned. Some years ago a young man, then heralded as an advanced intellectual genius, and since determined to have been little other than a disgusting German propagandist, used to determine the ability and adaptability of prospective employees by running $\frac{1}{32}$ contours all around their craniums and calculating the distance between their medulla oblongata and their pneumogastric nerve, and saying, when the answer was found, "My boy, you are a born machinist's helper, the fish-oil for yours." But, when you want to hire a salesman, test him by seeing whether he can sell himself to you. If he can, let him try to sell something to your customers. Your sales report will tell the story; your bank account will furnish the answer.

The salesman of mining machinery is a reflection of those with whom he deals. It could not be otherwise. As he gets deeper and deeper into the toils, he assimilates the viewpoint of the mine manager, in some cases even aping his picturesque manner of expression and characteristic taste in dress. Once upon a time, there was a young man called Smith (which was not his name). Said Smith found for himself a job with a local manufacturer of mining machinery. As he progressed from job to job, his superiors thought they discerned in him the spark of genius as a salesman. Smith, naturally imitative, took to aping the bluff heartiness, the superior swagger, and debonair bearing of the road salesmen, who, back from their trips, filled his head with their Munchausen tales of glorious accomplishment, and how they 'put it over' their envious rivals.

It was not long before he became so efficient an understudy that the boss decided to give him a chance 'on his own'. The great news told, Smith, beside himself with joy, rushed out to the nearest outfitter in order to prepare himself, not merely to be, but to look a mining machinery salesman. The next morning he put in his appearance at the office and nearly caused a riot. He was, like the 'Sassy Six' automobile, fully equipped with

A four-dent Stetson nearly three feet wide,

A pair of knee-length lace-boots,

A pair of flowing brown corduroy trousers, coyly tucked into said lace-boots, and, last, but not least,

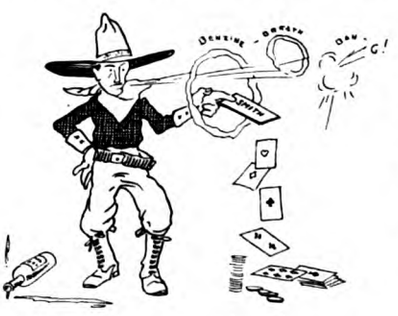
A benzine-tainted breath, as a symptom of his acquisition of an expense account.

Smith got fired, which, in a way, was not quite fair to Smith, whose imaginative temperament caused him to mistake the Dare-devil-Dick dime-novelistic yarns of the salesmen for the real literature of salesmanship.

Shakespeare once wrote something about the garb proclaiming the man, which may account for the paper cap and pile of shavings used so frequently by the cartoonist in depicting a horny-handed son of toil, yet, many an excellent mechanic comes to work in a cut-away coat and a hard-boiled hat of the derby variety. Every mine manager does not attend receptions in lace-boots and a khaki shirt worn decolleté, and every salesman does not rely upon John Barleycorn as his chief talking-point, nor camouflage his expense account. As a matter of fact, the best salesmen, those who have the analytical faculty and regard nothing as sold until it is in satisfactory operation, look like other humans and act like them.

John Barleycorn, as a first-aid toward making sales, is fast coming into disrepute in well-ordered business establishments. Time was, not so many years ago either, when no salesman could get away with his job without being able to load himself well below the Plimsoll mark, and still get home under his own power.

The mining man, a type quite distinct from the mining engineer, after having spent months in the waste places trying to find the elusive pay-shoot, came to town to buy a mill, incidentally, and to quaff deep of the distractions offered by the city as a major duty. The fortunate salesman who saw him first took extraordinary precautions to keep his 'game' out of the bags of his rivals, all of which was both the out and in-door pastime in the mining machinery district. Extraordinary strategy by the general staff was resorted to, wherein closed carriages, hotels of a kind, unlimited credit at the bar, and rides in the park were the order of the day, and night. Relays of salesmen doing eight-hour shifts were in constant attendance, while in the office, specifications and contracts were being rapidly typed in preparation for the psychological moment when the signature might be appended to the dotted line.



When the mining man reached that state of satiety when nothing looked so good as a pitcher of ice-water and a cold compress, the contract was produced, wearily signed, and the used-up conqueror of the desert and the mountains journeyed back to pure air, flapjacks and

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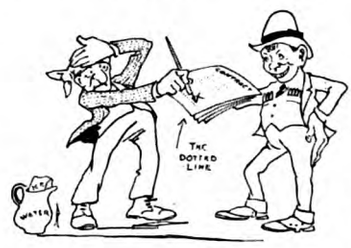
bacon, to await the coming of the mill that would demonstrate the existance either of a mine or of just another hole in the ground.

The best thing about such methods, and the salesmen that went with them, is that they are gone. Gradually, better business morality grew, not merely with the vendor but also with the vendee of mining machinery. The American passion for efficiency expressed itself with the summary curtailment of the expense account privilege, whereby close scrutiny by a cold-blooded person known as an auditor eliminated such items as 'sundries', under the cloak of which many indiscretions were formerly hidden. The cause of all this betterment is, of course, education, a more intelligent conception of responsibilities. The mine manager of today is a trained man, usually a university graduate, and so is the mining machinery salesman. Practice is applied with the logic of the thinker to the solution of the problem at hand, whether that problem be one of ore deposits and metallurgical treatment, or design and manufacture of apparatus. One large manufacturer of mine supplies exacts from his employees a signed pledge to abstain from alcoholic liquors during the period of their employment. Commercial hospitality, such of it as still remains, takes the innocuous form of an occasional lunch, dinner, or theatre party. The old-time orgies no longer have place; in fact, the easiest way to put the salesman out of the running would be to try and put over something of this kind.

There is a certain amount of regret, that in the passing of the old methods, and old salesmen, is also going the general practitioner. Ten or fifteen years ago, the mining machinery salesman was the whole show. He was expected to handle the job from soup to nuts, from caviare to demi-tasse. He could diagnose ore, draw up the specifications for the plant, both machinery and building material; prepare, unaided, the complete construction estimates as well as the cost of the machinery; go out and get the contract signed in competition with a lot of rivals; come home with the scalp of the mine manager under his belt and a check for the first payment; see the job through the shop, and, if necessary, take charge of erection of the machinery; turn the completed plant over in running order, and then, last but not least, come home, tired but happy, with a formal acceptance and a check for the final payment.

The tendency toward specialization to the *n*th degree has revolutionized the methods of the manufacturer of machinery and of his selling force. In the old days, the mining machinery manufacturer used to make everything in sight, not merely milling, concentrating, and smelting machinery but the power equipment, engines, boilers, compressors, rock-drills, in fact, nearly everything that went to make milling or smelting plants as they were in those days. Now practically everything in a modern mill or smelter is manufactured by a specialist, and sold by a specialist salesman.

Great establishments for specialized manufacture have been built up, international in their scope, whose selling organization and trade connections penetrate the far corners of the earth. In the old-time sense of the word, there are very few manufacturers of mining machinery any more, but instead there are manufacturers of air-compressors, hoisting-engines, ball-mills, concentrators, transmission machinery, power apparatus of each kind, and so forth. In the equipment for a modern mine will be found the product of dozens of specialty manufacturers, and many dozens more, when such details as belting, hose, pipe, valves, and fittings are taken into account.



The same transition has produced the specialized salesman, who knows air-compressors, but not ball-mills, concentrators, but not internal-combustion engines. One objection to this specialization lies in the divided responsibility. No one contractor can guarantee the performance of the plant as a whole. On the other hand, the highly developed concentration upon one piece of apparatus has resulted in an infinitely superior product than that turned out by the old-time jack-of-all-trades. A firm of consulting engineers, purchasing equipment a few years ago for a plant of considerable magnitude, interviewed some two hundred manufacturers' representatives before deciding upon the equipment that would be used. Under the old order of things, half-a dozen bidders would have sufficed.

The salesman is himself a specialist, a sales engineer in fact. He has a concentrated knowledge of his own apparatus in many cases far superior to that of the consulting engineer, who, himself, is a general practitioner, whose duty it is to co-ordinate all the various units into one efficient plant. As a result, the sales engineer is consulted with respect by the consulting engineer, and has a large voice in the selection of the apparatus; in fact, there are lots of consulting engineers whose reports would lack much without the sound knowledge imparted by the sales engineer.

The sales engineer gets no fee for professional services. He is supposed to be a sordid commercial person, who, by reason of the fact that he has something to sell, has his advice and counsel used, but not paid for. The consulting engineer collects the fee. If the sales engineer lands the order for his principals, well and good. If not, he turns to other prospects.

Many of the larger manufacturing establishments, appreciating the increasing responsibilities developing upon the sales engineer, have given much thought to his training. Young graduates in engineering courses from the universities are taken into the manufacturing establishment and put through a regular course of training, and are paid for their time as well. Generally two years are

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devoted to shop practice in various departments, supplemented by lectures in the evening by department heads on pertinent subjects. During the training period, the candidate absorbs a thorough practical knowledge of the manufacturer's product, and what is even more important, the spirit of the institution, morale, in other words: the inspiration without which no sales engineer can put heart into his work.

The observance of rigid standards of personal conduct are insisted upon; representatives, not mis-representatives, are wanted by the modern business establishment. Of the many cases of business turpitude and unfair competition investigated by the Federal Trade Commission during the period of the War, it is noteworthy that, of the offenders designated as such by the Board, comparatively few were American concerns, and further, that it was found that unfair competition, graft, bribery of officials, and other forms of business dishonesty were characteristic business methods of the Germans wherever they hung out their signs.

A few reactionary narrow-minded persons are prone to sneer at modern methods of sales promotion as a developer of natural resources because, forsooth, the motive inspiring the salesman is commercial rather than altruistic. This viewpoint is the sheerest nonsense. Things to be successful must be profitable, morally or financially. Things, schemes, and ideas must be able to withstand the acid test of practical application; they must pay; if they do not, they are failures. The salesman too must be made to pay. He cannot be made to pay, without, in turn, paying those with whom, and for whom, he deals. A salesman who introduces a piece of apparatus that renders good service to the user and a profit to the maker is doing a real constructive service; he is doing his bit toward making the world a better place for the rest of mankind.

Powdered Coal in Metallurgy

The following list of furnaces that have adopted powdered coal during the past year was compiled by C. F. Herrington for 'The Blast Furnace and Steel Plant'.

175 sheet-furnaces in black and tin plate mills.
175 pair furnaces.
125 annealing-furnaces, including those for tin-plate as well as malleable and steel castings.
15 galvanizing-pots.
50 heating and re-heating furnaces.
10 reverberatory furnaces.
12 Wedge roasters.
230 forge furnaces, including rivet, nut, and bolt furnaces.
3 spring-heating furnaces.
3 cathode furnaces.
3 anode furnaces.
3 tin-smelting furnaces.
8 copper-casting furnaces.
2 casting-ladles.
1 converter.
4 magnesite-kilns, besides a number of silver and lead furnaces.
2 open-hearth furnaces.

An Annealing Furnace for Crucibles

The ideal annealing-furnace consists of two chambers, the size depending upon the number of crucibles used. A firm that buys crucibles by the car-load has built a modern annealing-plant. It consists of two rooms side by side, each large enough to contain a carload of crucibles. The heating in this case is done by steam-pipes around the walls, sufficient to raise the temperature in the room gradually to 300°. When a new lot of crucibles is received they are put in one of these rooms. The heat is turned on and gradually raised until at the end of a week or 10 days it has reached the 300° point and eliminated all the moisture from the crucibles. They are kept in this atmosphere until they are all used. In the meantime, when another lot of crucibles comes in, they are put in the second room—the reason for this being that if they were to put the fresh lot in with some of the seasoned ones, the moisture in the new ones would counteract all the good effect that the previous heat had done.

After it is taken into consideration that a crucible which comes out of the Dixon kilns contains as little as 0.25% moisture, as soon as it cools and comes in contact with the atmosphere it is liable to gather as much as 6%. This would mean that in a crucible weighing 100 lb. there would be nearly one gallon of water absorbed, so if this 'green' crucible is placed in an oven where the dry ones are, the result can readily be seen.

Furthermore, it is necessary that some ventilation be arranged in an annealing-oven of this kind. One opening at the top on one side of the oven and another at the bottom in the opposite side allows for the circulation of air necessary to carry the moisture away. What has been said in regard to a plant to take care of a carload of crucibles is equally true in regard to a smaller quantity. The principle involved is the same, and the increased life of crucibles will certainly pay the expense involved in erecting this kind of a plant. A. C. Sorenson in 'Graphite,' December 1918.

THE CHINESE generally do not understand the relationship between paper currency and hard coins; they exchange the former for coins as soon as they can. If a gold standard were adopted by China, the gold would be hoarded. It is easier at present to maintain a silver standard system, and for China to unify the currency, according to a Japanese financier. Once the people were educated to the value of paper money, the gold standard could be introduced.

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Safety Devices for the Machine Shop

The best safety device is a careful man, but the chances of accident are materially diminished when care is supplemented by the best designed safety appliances. Some

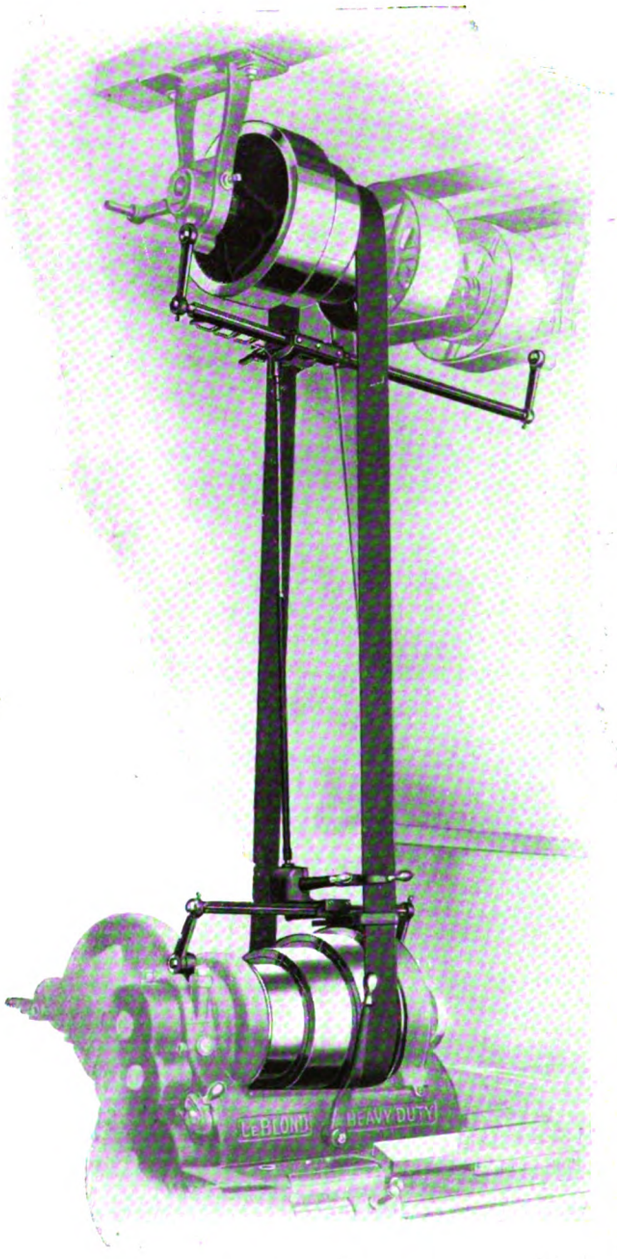

FIG. 1. BELT-SHIFTER FOR CONE-PULLEYS
Eccles & Smith, San Francisco

of those devised for use in the machine-shop and allied trades are shown here.

Fig. 1 shows the Le Blond belt-shifter for cone-pulleys and Fig. 2 illustrates the method of attaching and operating. Fig. 3 shows a belt-shifter designed for pulleys in general. It is mounted on a long handle, permitting all this work to be done from the floor and eliminating the danger from men climbing unsteady ladders to adjust

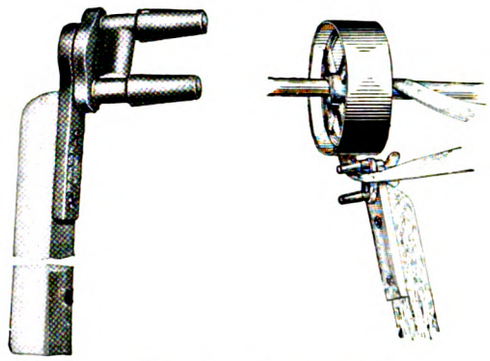

FIG. 3. BELT-SHIFTER
L. F. Grammes & Sons, Allentown, Pa.

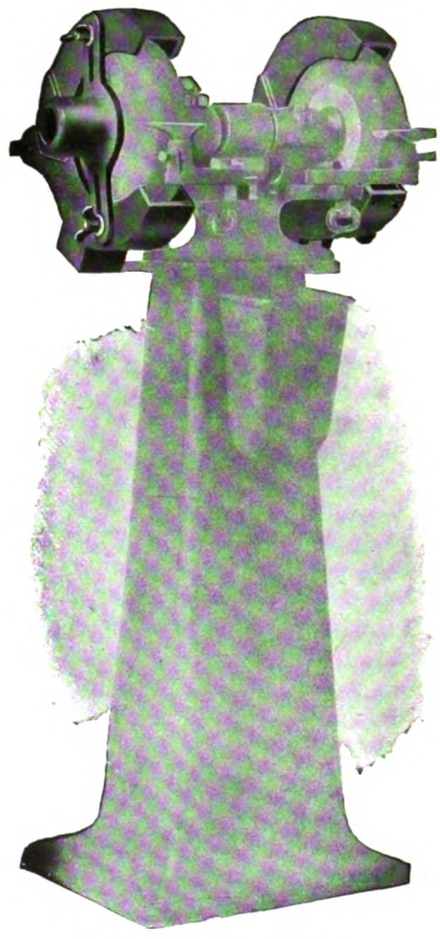

FIG. 4. GRINDING-WHEEL
L. F. Grammes & Sons

belts. As will be seen from the figure, the shifter itself has three rollers, two of them being tapered.

Grinding-wheel accidents frequently have serious results. Fig. 4 shows a hood designed in accordance with

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the recommendations of a committee of abrasive-wheel manufacturers. The guard is fastened by a bracket that can be adjusted to almost any type of grinder-head, or side-support forms a guard for the grinder-head arbor. Fig. 5 shows a safety-flange for a grinding-wheel. These are made with a taper so that the bearing against the

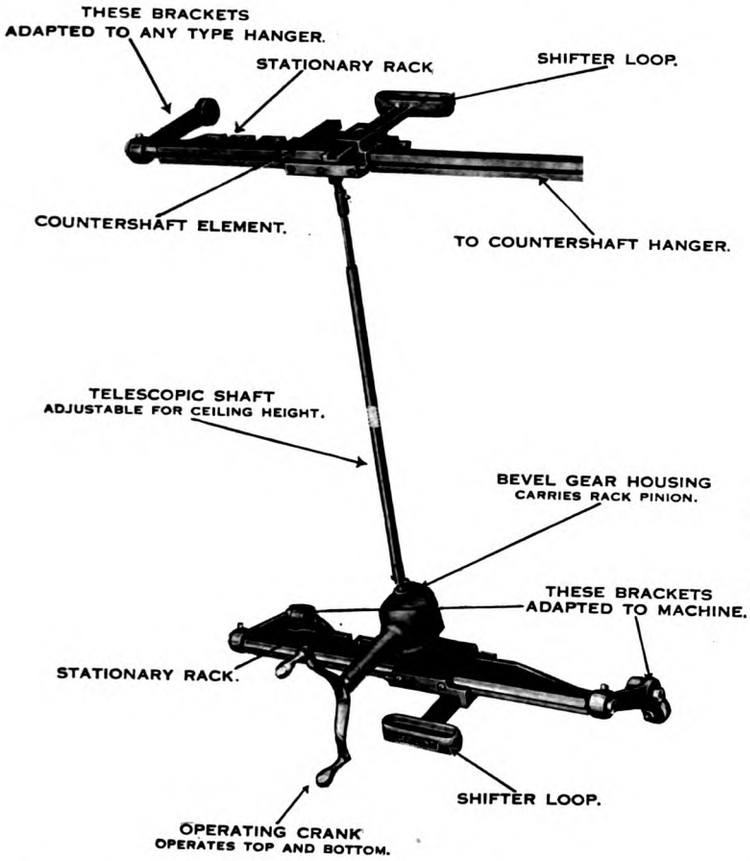

FIG. 2. PART OF BELT-SHIFTER FOR CONE PULLEYS
Eccles & Smith

FIG. 6. EYE-SHIELD FOR EMERY-WHEEL
L. F. Grammes & Sons

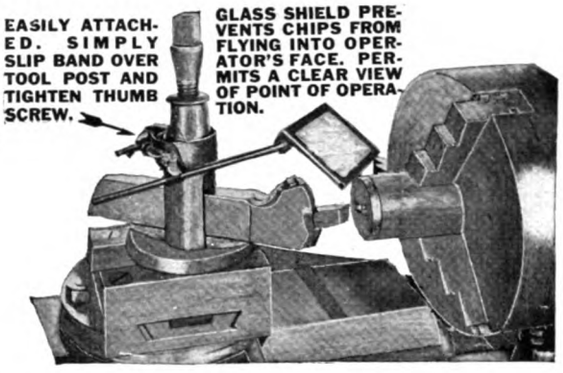

FIG. 7. GUARD FOR LATHES AND SCREW-MACHINES
L. F. Grammes & Sons

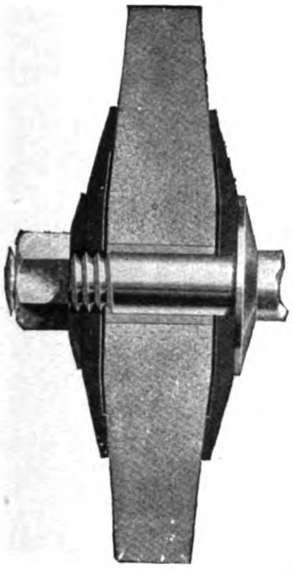

FIG. 5. SAFETY-FLANGE FOR GRINDING-WHEEL
L. F. Grammes & Sons

sides of the wheel is near the outer edge of the flange only. If the wheel breaks, the bearing of the flanges on the wheel occurs at the greatest radius, thus holding the

FIG. 8. SHIELD FOR USE IN CHIPPING OR GRINDING
L. F. Grammes & Sons

a special bracket can be made. As the wheel wears down, the guard can be adjusted from the rear so as to keep the face of the grinding-wheel at the front and usable. The broken part to the flange. Fig. 6 shows an eye-shield that can be attached to the wheel-hood and adjusted to protect the operator's eyes from flying particles.

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Fig. 7 shows a chip-guard for lathes and hand-fed screw-machines for protecting the operator's eyes from hot chips. When not in use the rod holding the framed glass may be moved out of the way. A shield designed

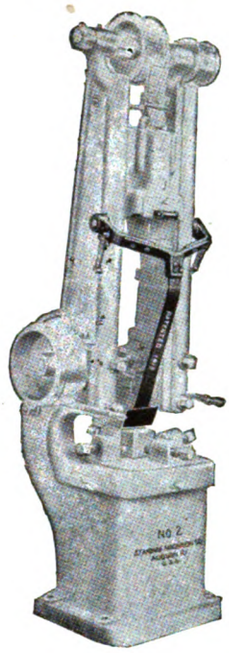

FIG. 9. DROP-HAMMER GUARD
L. F. Grammes & Sons

particularly for the protection of neighboring workmen from flying chips or sparks produced by either chipping or grinding is shown in Fig. 8. It consists of an iron frame and a fine wire-mesh screen. It may be placed and securely fastened to either the bench or the floor.

Fig. 9 shows a guard designed for any type of plain automatic drop-hammer where the operator uses his

FIG. 10. WELDER'S GOGGLES
L. F. Grammes & Sons

hands to place the work on the die. It consists of a plate that swings over the face of the die. When the hammer is at the top of the stroke, this plate is back of the die, so that the latter is exposed in order to permit the operator to put the work in place. When the hammer descends, the roller engages the inclined arm on which the plate is supported, causing it to swing across the face of the die. Should the operator trip the hammer and neglect to move his hand, the plate will push it out of danger. The face of the plate is covered with leather so that it cannot bruise the operator's hand. The guard will operate whenever the hammer descends, either in the usual way or because of an accident such as the breaking of a belt.

Fig. 10 shows a pair of special goggles for welders.

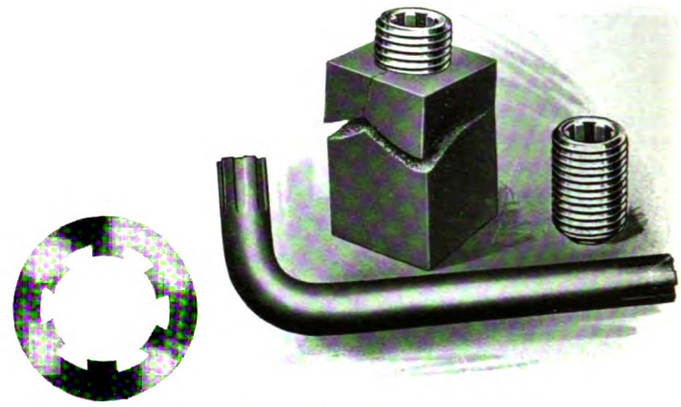

FIG. 11. SET-SCREW
The Bristol Company

The lenses are made of a combination of a strong colorless optical lens and a Crookes glass, with a thin film of gold between the two. These are fused together, making them practically as solid as one piece of glass. The gold film reflects the extreme heat-rays, while the Crookes lens serves as a protection against the ultra-violet rays.

Fig. 11 shows the head of a 'Bristo' set-screw, also the entire screw, the special wrench used with the screw, and a test-block that was broken before the screw was injured. On account of the shape of the slots in the head, there is no danger of expanding or splitting the screw by bringing too much pressure on the wrench.

A MAN bought a Ford. He equipped it with shock-absorbers, gas-savers, demountable rims, self-starter, the kind of lights that one can see by at night, tire-carrier, tool-box, lock, fancy top, plate-glass curtains, patent cooling-device, tire-pump, one-piece floor-board, large steering wheel, oiling system, a new hood, speedometer, and clock.

Another man bought a Ford. He took everything off but the engine, transmission, steering-gear, and wheels, and put on a soap-box for a seat.

They are both happy!

Two political candidates were discussing the coming local election.

"What did the audience say when you told them you had never paid a dollar for a vote?" queried one.

"A few cheered but the majority seemed to lose interest," returned the other.

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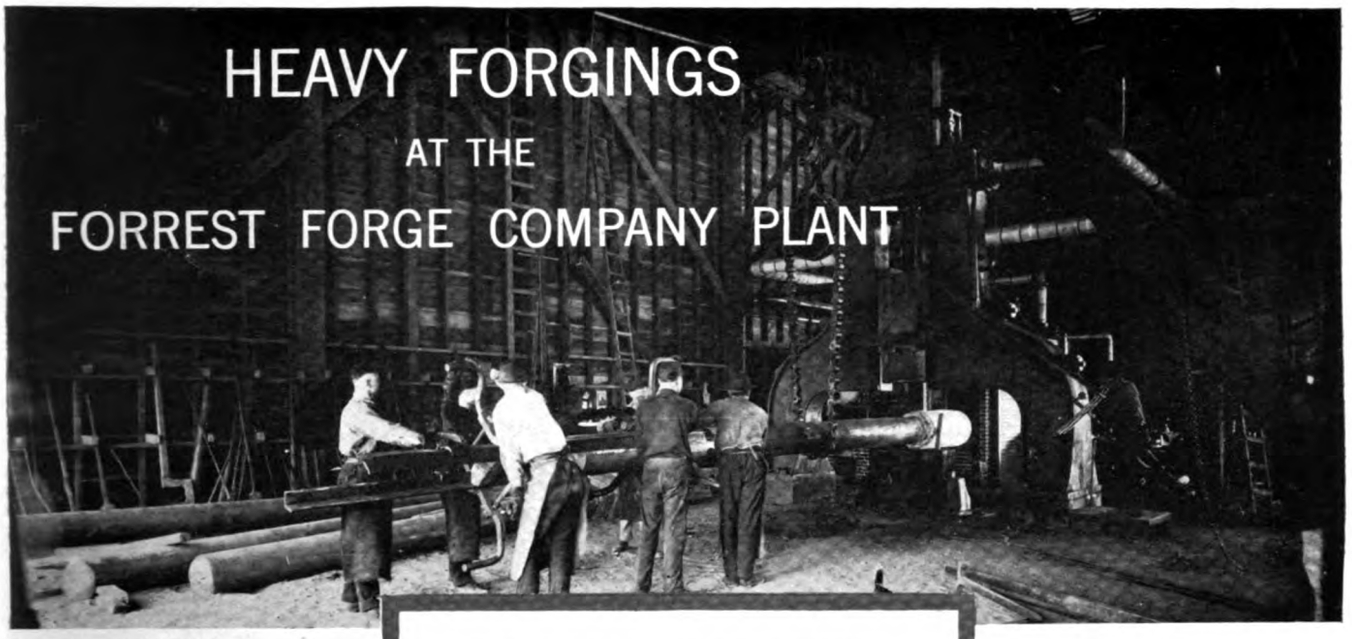
HEAVY FORGINGS AT THE FORREST FORGE COMPANY PLANT



By P. J. FORREST

FACILITIES for the manufacture of the heaviest forgings are available in the San Francisco Bay district, marking another step toward independence of Eastern plants as far as the Pacific Coast is concerned. Besides the larger forgings, the Forrest company is equipped for quantity production of small work. This article describes the plant of the company at Oakland, also some of the more important work that has recently been done there.

THE October number of 'Metal Trades' described an important Pacific Coast achievement, namely, the manufacture of sand-cast forging ingots equal or superior to any made in the East. However, there would have been no advantage in making large ingots here unless equipment had been available for forging them after they were cast. This equipment, which is large enough for the heaviest forgings, is installed at the shops of the Edwin Forrest Forge Company.

The company's shops are at East Oakland, near the 23rd Avenue bridge over the Oakland estuary. There are two buildings. The larger building, which is 100 by 200 ft., contains the heavier forging equipment and all the boilers. The other building, which is 60 by 200 ft., contains the smaller equipment, the office, and a small machine-shop for repairs to machinery and similar work. In the rear is the receiving-yard, which is equipped with a hoist and a derrick with a 50-ft. boom and a capacity of 25 tons.

Near the centre of the large building is a 1200-ton hydraulic press made by the United Engineering & Foundry Co., which is the largest press in any shop on the Pacific Coast. Fig. 1 shows the upper rudder-stock of the Standard Oil Co. tank-steamer 'Richmond'. This is the largest ship-forging ever made in the West. The ingot was supplied by the Judson Iron Works and then forged under this press. Had a stock of this size been required two years ago, it would have been necessary to have the work done in the East, and the owners would either have been obliged to wait a month or six weeks for the forging or else to re-design the entire rudder construction. Instead, the forging was in the lathe at the Potrero plant of the Bethlehem Shipbuilding Corporation ten days after the Forrest company received the order. In the foreground are worm-turning devices with a capacity of 20 tons so simple that a boy can handle them, and which save four or five men in the forging crew without impairing efficiency.

Toward the front of the shop are two Niles-Bement-Pond steam-hammers, one 4-ton and the other 3-ton. Fig. 2 shows a crank being forged under one of these hammers. This crank is for a 500-hp. engine made by the Skandia Pacific Oil Engine Co. All heavy cranks are forged from 36-in. octagonal sand-cast ingots. They are first 'slabbed down' under the 1200-ton press and then finished with the hammer. Best results are obtained by this method, as forging under the press works the metal clear to the centre of the ingot. After the hammer-work is finished, the cranks are annealed in specially designed furnaces to remove all traces of hammer-strain. If it is desired, the webs are cut out with the oxy-hydrogen torch. The equipment used will cut forgings as large as 20 in. square.

The large building also contains eight furnaces large enough to handle any-size forging and five boilers, four 100-hp. and one 250-hp. All the furnaces in both buildings are oil-fired.

The other building is devoted mainly to quantity production of small forgings, such as gears, tractor, gas-

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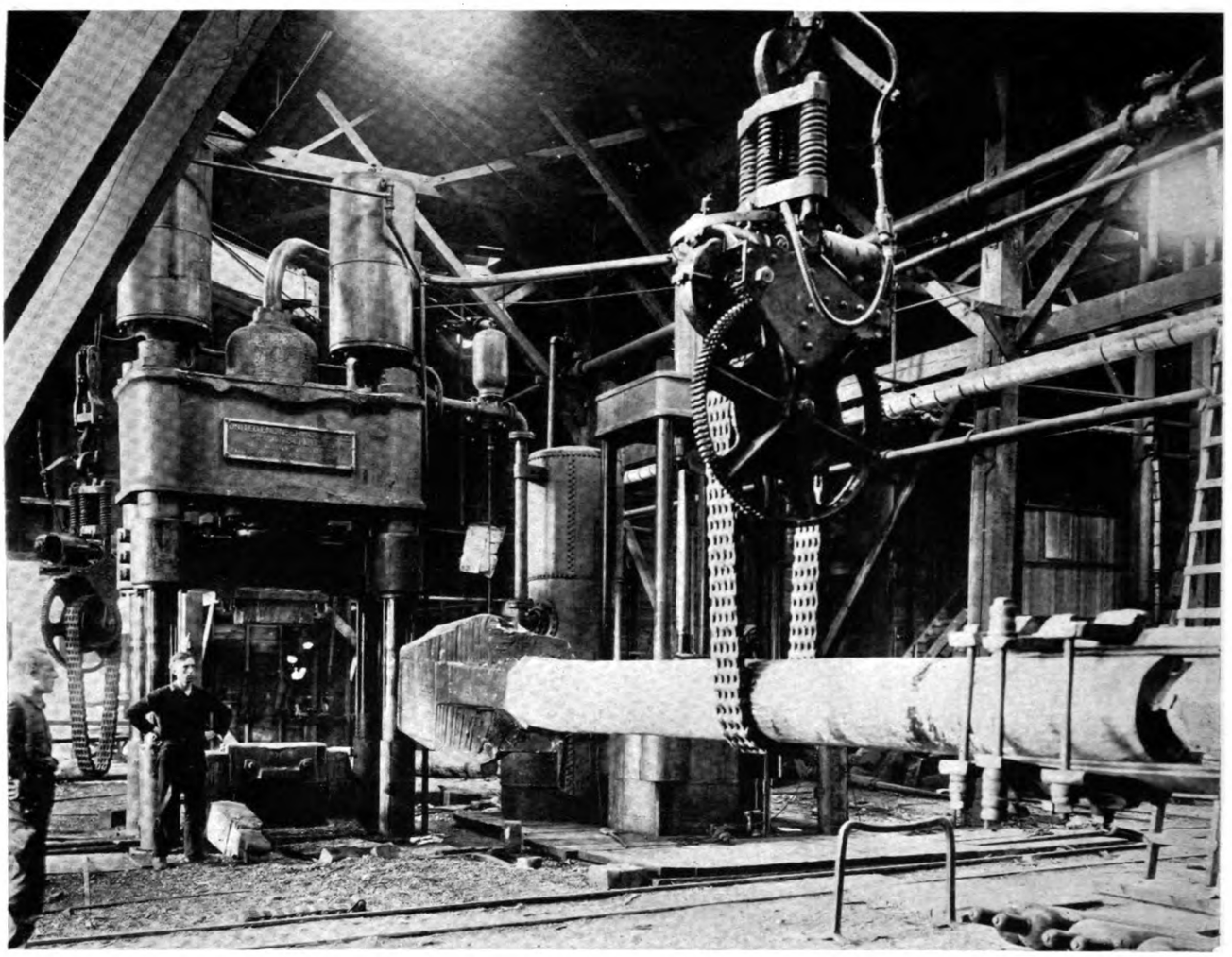

FIG. 1. UPPER RUDDER STOCK FOR STEAMER 'RICHMOND'

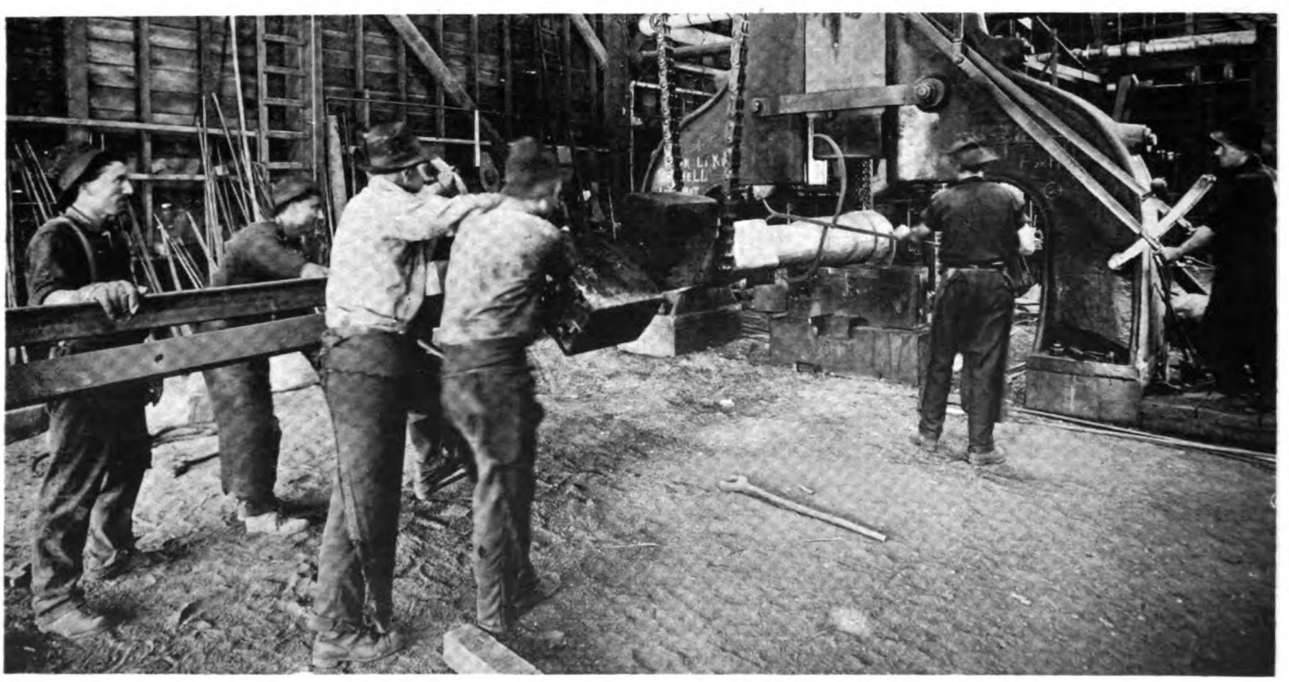

FIG. 2. FORGING A CRANK FOR SKANDIA PACIFIC OIL ENGINE COMPANY

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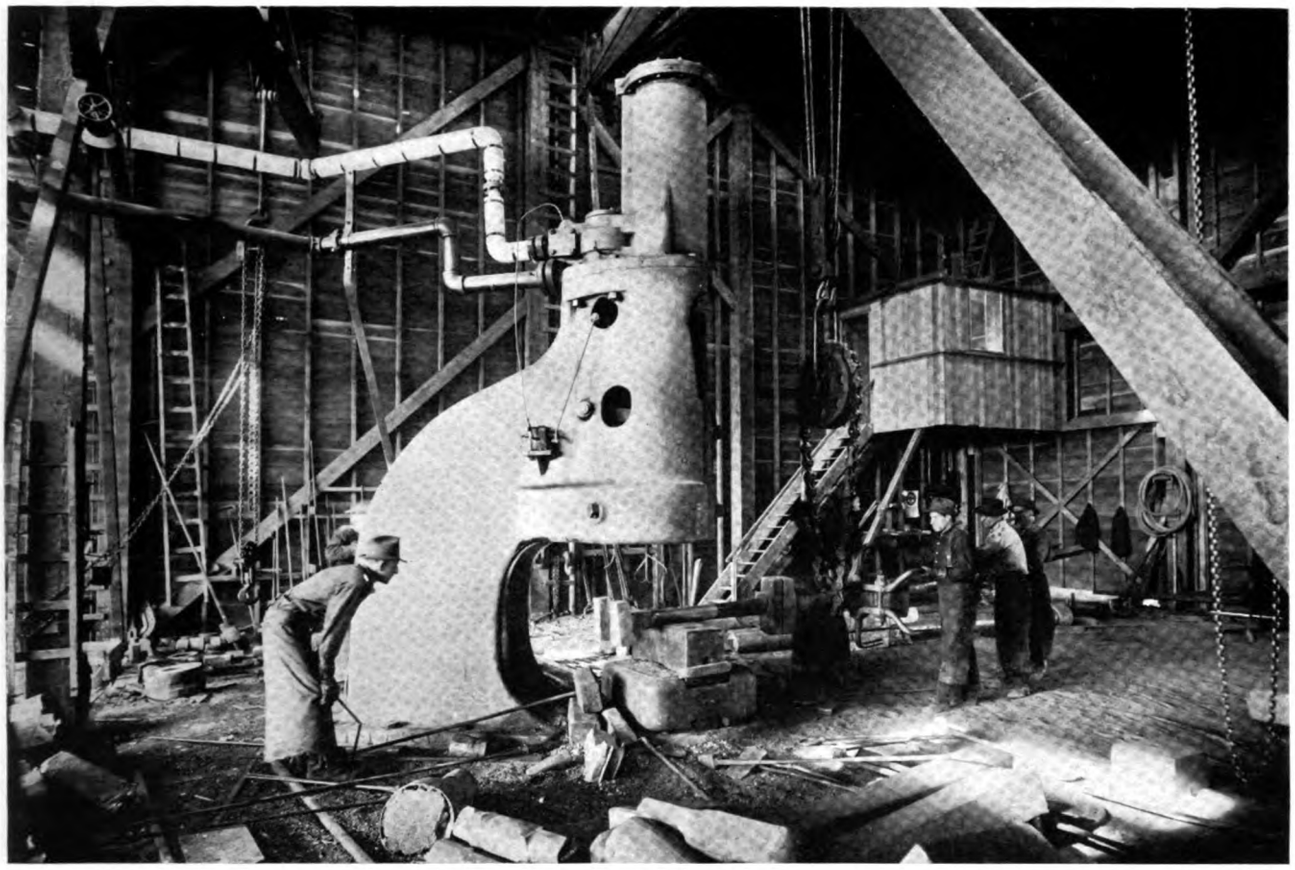
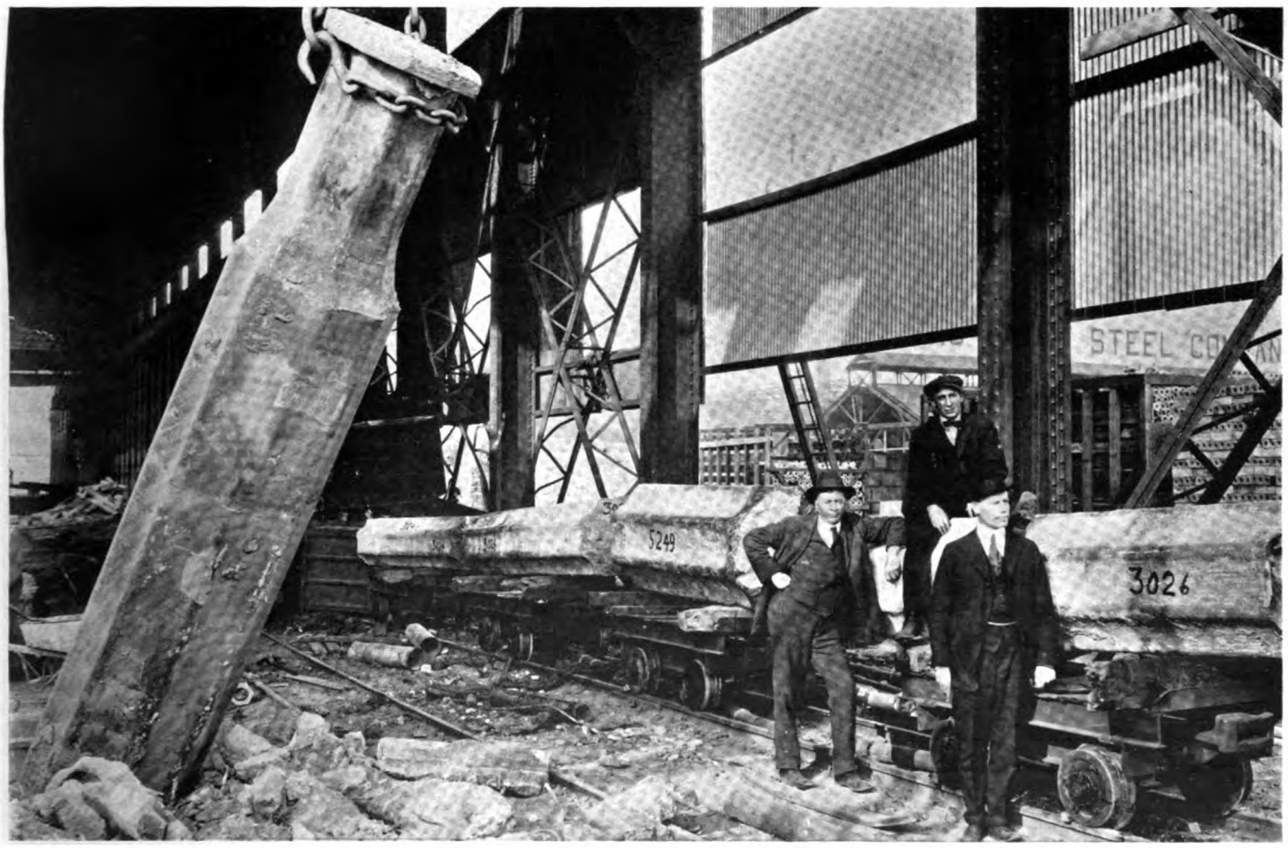


FORGING UNDER LARGE HAMMER



TRAINLOAD OF INGOTS AT PACIFIC COAST STEEL CO. PLANT READY FOR SHIPMENT TO THE FORREST COMPANY

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engine, and automobile parts, and general shipsmithing. There are six 1500-lb. steam-hammers, a 5-ton crane and eight jib-cranes, and nine small furnaces.

During the months of October, November, and December last, the Forrest company used about 1500 tons of ingots. Out of a total of 270 ingots, there were only six rejections for all causes, indicating the efficiency of both the manufacturer and the forge-shop.

The company's shoes and dies, which are made of manganese steel, are sold in foreign countries as well as in the United States. It has been shown that by using the best of materials and workmanship a trade can be built not only in shoes and dies but in several other articles as well, in successful competition with the East.

Efficiency Exceeding 100% Obtained by Inventor

THE following letter was received by a well-known pump manufacturer. The exact efficiency obtained by the inventor is uncertain, but it must be well over 100%. Since we are informed that the pump-maker did not accept his offer, we are ready to furnish the inventor's address to any of our subscribers that may see in the device an opportunity to capture the foreign trade.

"Gentlemen:

"I have been studying water power and water power wheels for 30 years and I have at last perfected a wheel that suits me exactly. My wheel is designed to give the most or greatest power with the least amount of water, and will give twice the power with half the water used by the present type of turbines; and my wheel will run and give power under a low head that will not hardly turn a turbine at all. Also it works well under a very high head, and gives enormous power. It is so constructed that it can be got most anywhere under most any condition, and no special dam has to be constructed for it. It can be built small, light, or large and heavy, with power from one horse or less to a million or more, as you wish. It requires no water house or casement as the wheel casement and intake is all together as one piece.

"Small wheels for creeks, springs, trenches and small rivers need no special dam; merely dam the streams by piling in brush and racks and plastering with mud. Then cut a ditch or race down a piece and run the water to the wheel in a wooden trough, plankway, or iron pipes, as desired. The wheels can be fastened to legs or set upon cement foundations, or merely wedged into the racks, to suit the case. But for heavy power or large rivers, of course they require more attention and special fixtures.

"I am sure you need this power wheel in your business, and if you would adopt it or take it up you most surely would find it a paying investment. And if you want it, or try it out, I will assign to you or your corporation or company, or to any person you may name, a one-half interest in the patent that can be obtained, provided you agree to and pay all legal fees as may fall due, that it requires to obtain the letters patent; and after you have tried it out and have been convinced it is IT, then I will sell you outright my half, or lease it to you on the royalty plan, as you see fit. I am not asking you for any money in advance. You can send the fees direct to the attorney at Washington, D. C., and you are not trusting me with any money at all, and I could not cheat you or graft you even if I wished, for the U. S. Government would not allow anything of this sort to pass.

"If you are interested and would like to know more about the wheel and more about my plans, why, write me and I will be pleased to explain all fully and clearly. I will hold my proposition open to you until Dec. 6th this year. After that it will be doubtful just what I will do.

Yours truly,
X. X. X.

"Also, I have a United States Letters Patent on improvements for suspension bridges that I will sell in whole or in part. If you need a bridge this is the best and strongest system on earth. Will span a river a mile wide without a post, pillar, pile or trustle. Roadway as rigid as a rock and will hold up all you can roll upon it; that is if you set your anchors aright."

Steel and the War

How closely the fortunes of war followed the relative steel-producing capacities of the Allies and the Central Powers is shown by statistics that have recently been compiled. In July 1914, the steel-producing capacities of Great Britain, France, and Russia and of Germany and Austria were approximately equal, with the advantage slightly in favor of the Central Powers. Germany, however, immediately overran Belgium and northern France, reducing the Allies' output, and increasing her own somewhat, although it now appears that most of the captured works were dismantled, instead of being operated. The general result, however, was to give the Central Powers a considerable preponderance during most of the first year of the War. In May 1915, Italy entered the War, and, about the same time, imports of steel from the United States began to be large enough to be felt. During the next two years, England increased her capacity, and so also did France in the territory remaining to her. Russia, on the other hand, went from bad to worse, and, although no statistics are available, probably became negligible as a steel producer early in 1916. The total production of the Central Powers also decreased somewhat, but, in general, there was substantial equality in available steel during the two years immediately preceding America's entry into the War. This event threw the scales all out of balance, and, during the last year of the War, the Allied countries produced at least three times as much steel as did Germany and Austria.

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The Wastes of the West—IV

By Miner Chipman

TEAPOTS AND STEAM-BOILERS

THE boy, James Watt, sat gazing at the top of the dancing teapot. As he watched it, he saw it grow and expand. The dancing lid became the piston of a giant engine. The teapot grew, through a process of mechanical evolution, into the modern steam-power plant. What made it possible? Organization and Control! The high-pressure steam-boiler became a reality because of a little system. A record of the steam-pressure inside the boiler had to be known, or there was grave danger of an explosion. The steam-gauge was invented. Wash-boilers, teapots, and kettles do not require steam-gauges.

The high-pressure steam-boiler became a reality because of a little system.

As the modern steam-power plant is an outgrowth of teapot development, so the modern manufacturing plant is the outgrowth of individual enterprise. The difference between large business and small business is one of pressure. Pressure must be measured. Gauges must be put upon men and machines. Organizations 'blow-up' as well as steam-boilers. One of the wastes of the West may be found in those plants that have 'steam-boiler' jobs and 'teapot' organizations. Wasted energy is going out of the spout and around the dancing lid. Managers are afraid to cork up the spout and fasten down the lid. They know that any significant pressure would blow the thing to pieces. It is difficult to convince the Western manufacturer that a 'steam-gauge' placed upon his organization would let him grow and assume the pressure of bigger, better business. He is contented with the little plant, the little output, the little business.

Many plants have 'steam-boiler' jobs and 'teapot' organizations.

The Western manufacturer must have a cost system. I do not mean an accounting system with a lot of fancy-colored cards and indexed files. I mean a practical up-to-the-minute statement of cost production. Before he can have a proper cost-keeping system, he must know how to plan and dispatch the work in his plant. Planning and dispatching is the pulse of organization.

Systematized planning and dispatching usually results in a 15 to 20% increase in production. It is easy to compute what that means in dollars and cents. It is such a simple proposition that I wonder why planning and dispatching is not as much a part of organization and operation as any other modern device. The trouble seems to be that records have become confused with red-tape. A record is something that tells a fact. Red-tape insists upon your doing something in a certain particular manner. I believe in records. We are all opposed to red-tape. A steam-gauge is not considered to be red-tape because it is an essential record. The right kind of system in your ship will not be red-tape, for it will be like the steam-gauge, an indication of conditions and tendencies. Unsystematized management is a scheme of 'passing the buck'. 'Let George do it!' The boss does not plan the work, so it is passed to the foreman. He is kept busy attending to a thousand and one details, and has little or no time to study the work ahead, and plan out the work for tomorrow. We have what is known as the daily planning-schedule of the general manager. The general planning-schedule is based upon the sales orders, and upon the sales policy. Under this system delivery dates mean something. Here in the West, most of the foremen are assistant general managers. They are supposed to do the work of the general manager, and be foremen as well. Now it is quite some job to be a good foreman, and to be a good foreman does not mean that a man would be a good general manager. When such a condition exists there is going to be waste. There will be wasted time, wasted material, and wasted money.

Unsystematized management is a scheme of 'passing the buck'.

With a certain number of orders on file, for a certain specific number of units, there is a one best way of planning the work to secure the lowest cost and the highest production. The general manager who does not see to it that the best plan is carried out is a teapot manager on a steam-boiler job.

The making of anything from a steel needle to an automobile, requires certain materials, certain machines, certain operations, and certain men. If these materials pass to the right machines, at the right time, and the right men perform the right operations in the right way, you have a minimum cost and a maximum production. But if you have no standards of material, no standards of men and operations, you have the dancing top of a teapot, and not the uniform stroke of the steam-engine.

It requires brains to be a manager of men. Definite positive knowledge is what we calls brains. 'Passing the buck' is not management. The manager who 'passes the buck' in management is the same fellow who 'passes the buck' in labor problems, and side-steps price-maintenance and trade ethics. Wherever you find the loose rule-of-thumb notions of management, you will find labor problems, price-cutting, and cut-throat compe-

Wherever you find loose rule-of-thumb notions of management, you will find labor problems, price-cutting, and cut-throat competition.

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tion. When wits rather than ability are the measure of managers, the community must suffer the consequences.

An illustration of the lax idea of organization throughout the West is the fact that foremen, and even members of the office force, belong to, or owe allegiance to the trade union. The union is slowly and gradually absorbing the management. Don't blame the unions. One of the fundamental ideals of the syndicalists has been the complete absorption of management. The one great reason why the trade union has grown to be such a powerful factor in the industrial life of this community has been because of the fact that the owners and managers of our industrial plants have drawn no clear and definite lines of function and responsibility. The leaders of the trade-union movement have taken advantage of the situation. The office help, the stenographers, the order-clerks, the cashiers, all of them will soon have headquarters at the Labor Temple. And why not? What is the manager doing to interest them, hold them? What incentive is offered?

What has been the cause of this situation? Can it be possible that the trade unions have become so powerful that the owners and managers of industrial plants in this community cannot run their business efficiently? Can it be possible that the union will not permit the manager to know his costs, plan his work, and better his product? Some of the employers say so. Are the unions to blame for the lack of organization and control? Have the employers become so weakened, and the labor unions so powerful?

I do not think so. The trade unions are strong because certain employers have sought individual advantages through little surrenders to the unions. The workers are strong because they are united, the employers are weak because they are not united. Mere association does not make for strength. The Chamber of Commerce, the Metal Trades Association, or any other association is not strong because of itself. Its strength lies in its ideals and aspirations, and how deeply these fundamentals are driven into the heart and fibre of the membership. The trade unions are fighting for certain clearly defined ideals. There are certain ultimate goals to which the union aspires. There is such a thing as a perfect agreement, a maximum wage, the shortest possible day's work. The ideal of the union is to procure the maximum share of the product of labor. Every little gain is a step toward the attainment of that ideal. Control of the management, reduction of hours, increases in pay, these things bring to the worker a constantly greater share in the product of labor. That is what the union stands for, fights for, and strikes for.

The trade unions are strong because certain employers have sought individual advantages through little surrenders to the unions.

There is no one thing in life which is so misunderstood by the employing class as the ultimate aims of the trade-union movement. The employer who surrenders a certain point considers it to be a temporary expedient. In fact it is nothing of the kind. It is one more step toward the ultimate ideals of labor. The workers are not fundamentally interested in your investment or your profits. That is your business. His one interest is his home, his life, and his future. The majority of your workers are not bums or loafers. Most of them are homekeepers. You pay Jack $5.80 a day for eight hours work, and Jack works eight hours in order that his family may live twenty-four. He is not vitally interested in how much work he does for the $5.80, but he is interested in what the $5.80 does for the folks at home. That is where the bonus, premium, and profit-sharing schemes fall down. All of them miss the real point. Jack is working for the family and not for you. That is not exactly as we would like it, perhaps, but it is the way it is, and we must make the best of it.

Jack is not vitally interested in how much work he does for the $5.80, but he is interested in what the $5.80 does for the folks at home.

I am told that the production per man has decreased as wages have advanced. I am not surprised. Why should Jack do more work, or as much work, if he can get more money for doing less. The employer may kick and complain, but Jack gets $6.40 for doing the same work for which he was formerly paid $4. The would-be-clever employer says: "Well, I don't care, we will pass it on to the consumer." The law of diminishing returns sets in, and the consumer does not buy. The employer says that if he fails the worker is without a job. That does not necessarily follow. A sucker is born every minute, and Jack knows there will be another job somewhere. In any event, Jack got his while the going was good . . . and that is what the union is after. I can see no end to this process. Just as long as the employer refuses to organize his business, and surrenders point after point to the union, there can be but one end.

But the employer will get busy long before the end arrives.

THE great statesman, just back from Russia, was concluding his address.

"I have explained to you," he said, "the rise of the revolutionary movement in Russia, the economic conditions preceding the fall of Kerensky, and the difference between a samovar and a nitchevo. Before I leave the platform, does anybody wish to ask me a question?"

There was a pause. Finally a timid, scholarly looking man with ink on his nose stood up.

"What is your question?" asked the speaker of the day, with a benevolent smile.

"I would like to know," said the man, "how the bolsheviki get their shirts off over their whiskers."

A KENTUCKY darkey, now in an army camp, has written home to his former employer: "Please, mom, write to Uncle Sam and git me discharged, so I can come home. I ain't nothing but an expense to the Government."

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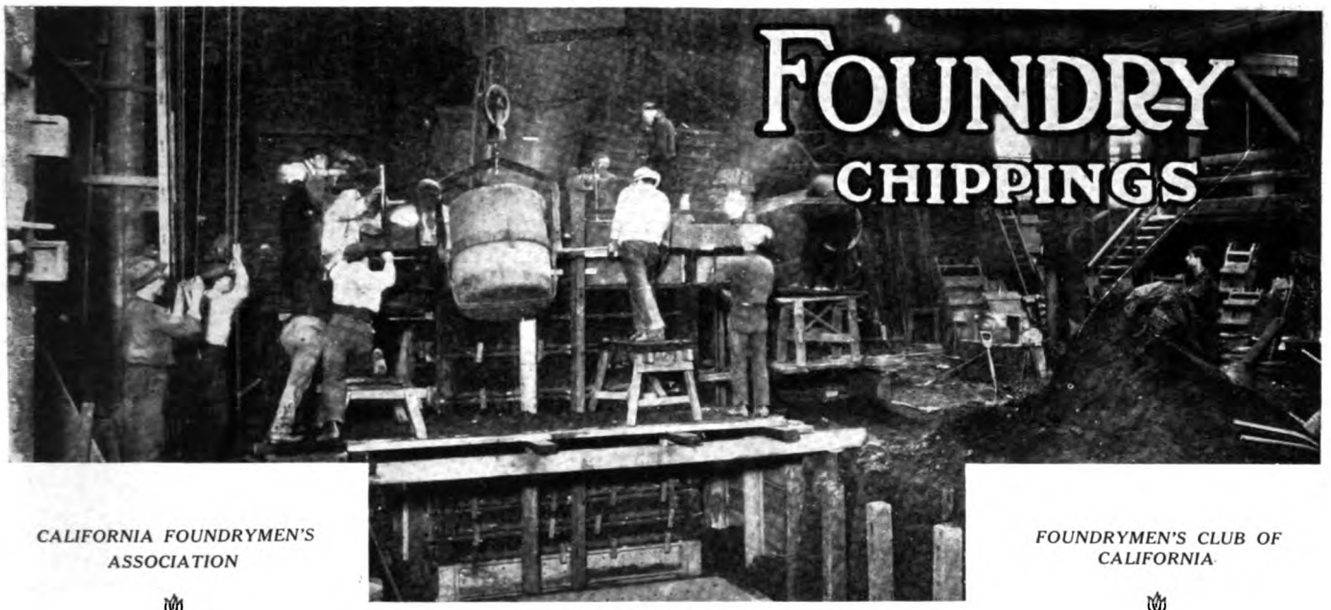

CALIFORNIA FOUNDRYMEN'S ASSOCIATION

FOUNDRYMEN'S CLUB OF CALIFORNIA

D. GUILD, Jr., Editor
Phoenix Iron Works, Oakland

What Have You Done?

The greatest war in history has ended in an ignoble defeat for the Central Powers. Fighting has ceased under the armistice agreement and it is not likely that hostilities will break out afresh.

It has been the most terrible and destructive war the world has ever known, caused jointly by the modern weapons of warfare and by the wanton brutality of the defeated nations.

Now that it is over, each and every one should ask himself what he did to hasten its end in a victory for justice and humanity.

Did you join the great army of victory, the finest and cleanest body of men in the world, and go 'OVER THERE'?

Did you help our Government by buying Liberty Bonds and War Savings Stamps until it hurt?

Did you help alleviate the sufferings of the wounded heroes by contributing liberally to the support of the Red Cross?

Did you subscribe to the other kindred organizations working to make the lot of our boys in the trenches a little easier?

If you were one of those that stayed at home were you in the front-line trench of the occupational army doing more than your bit?

Did you help feed our allies and our own boys over there by saving over here?

If you cannot answer 'Yes' to any of the above questions, it is not yet too late to lend your services to mankind.

Great as the task of winning the War has been, yet a far greater and more difficult one lies ahead; that of reconstruction and the return of the country to normal conditions.

This can only be accomplished by the united effort of all. If ever there was a time for sober thought it is now. Each and every one of us, whether employer or employee, owes it to himself and his country to see that his efforts are turned in the right direction, and not to be swayed by the present radical element that is menacing not only our own country but also the entire world.

In doing this you will be in the position of knowing that you also helped, and although it lacks the patriotic features of our 'WINNING THE WAR EFFORTS', it, nevertheless, is of paramount importance at this time.

D. G., Jr.

That Cored Hole

At the annual banquet of the California Foundrymen's Association, held December 21 last, at the Palace Hotel, there was displayed among many others on the walls a placard that read "A core is a hole that costs money to make." The absurdity of this description of a core nearly provoked a discussion on the subject, but the crowd was not interested in cores that night and passed rapidly over the matter. However, while cores, core compounds, and core mixtures have lately been given so much attention at the club meetings by core-makers and foundrymen generally, a few words on the subject might be of interest to others who read this journal. The above description of a core may be badly distorted, but it is not as far out as the average draftsman's idea that a core is

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a substitute for a twist-drill and that cored holes do not cost anything, but make the casting that much lighter.

Cores are of many kinds, shapes, and sizes and are used for many reasons and purposes, and rightly so; but good judgment in knowing where to use cores and where not to use them has much to do with success in the foundry business; and the subject deserves more consideration in the drafting-room and machine-shop than it has so far received on this Coast. Every bolt-hole shown on the drawing lettered 'core' is so marked for the reason that the designer thinks he is getting the hole in this way for nothing or a little less, whereas, if he knew just how much cored holes cost, he would reason that if they were not paid for directly they would have to be indirectly. In many instances he would change that little word 'core' to 'drill', with the result that the finished article would be produced cheaper and would be better in appearance and quality. C. M. H.

Foundry Practice in Australia

By H. E. HENDERSON

THERE comes a time in the life of every man when the desire to travel takes possession of him, becoming almost irresistible. The desire to visit other lands, and to learn from experience, the greatest of all teachers, just how the other fellow is conducting his business of life made itself known to me toward the end of 1916, soon after the expiration of my apprenticeship as an iron molder. Thus far I had seen the interior of only two foundries, both of which were in California; and having heard much concerning the Englishman and his exacting methods, I decided to investigate for myself.

The war being on, England, of course, was out of the question, so I finally decided upon Australia as my field for experience. I landed in Sydney on January 30, 1917, a cold rainy day; and my first impression of Australia was far from being a favorable one. Everything that caught my eye seemed to have a queer old-fashioned appearance, and I felt indeed 'a stranger in a strange land'. However, the object of this article is not to discuss impressions, but rather facts concerning the Australian foundry.

After four days of sight-seeing in Sydney, I went to work in a small jobbing shop on Erskine street. There were four molders beside myself, and the entire floor space of the shop did not exceed 15 by 30 ft. The yard had about the same dimensions, and contained the cupola, chipping-room, core-room, iron flasks (very little wood is used there), coke, iron, and various kinds of sand. It is hardly necessary to say that we were somewhat cramped for space. It was ludicrous to see five husky molders standing out in the rain with hand-ladles, waiting for the tap-out, and then to watch them groping about in a dark shop, splashing molten metal over the top of the molds, trying to find the gate. It was a good thing that those flasks were made of iron, or they would not have lasted a week. Although they had a goodly supply of iron flasks, I soon found that none were matched, and that a 3 by 6 cope was most suitable for a 3½ by 6½ drag. The rest of the shop equipment corresponded closely to that mentioned above. Owing to the absence of windows, the roof was swung on hinges, and was raised each morning, with the aid of pulley-blocks, to admit the sunlight. In case of rain the roof was lowered, and the men were forced to cease work until the storm had passed. Strange to say, I never heard a man there complain of rainy weather.

Owing to a shortage of work, I was laid off at the end of the third week. However, the next day a struck a job in a malleable shop, and my second experience proved a considerable contrast to the first. Here they made a specialty of light castings. One contract in particular that is worthy of mention was with the Australian government: namely, an order for two million toe and heel clips for soldiers' boots. They had four aluminum plates made; each plate containing four heel-clips and four toe-clips. This job kept four men busy on hand-squeezers, each man putting down two hundred snaps per day. The work was done on a piece-work basis. I might mention that most piece-workers in Australia are paid for the number of molds made, regardless of whether the castings are good or bad.

One of the largest stove and bath-tub shops in Australia is conducted under the name of 'Metter's Limited'. I worked there for about three months, finding it the most Americanized shop in Sydney, being far advanced in both methods and equipment over any of the others. Here they specialized in stoves, bath-tubs, and sinks; and they succeeded in turning out as fine a grade of castings as could be found anywhere. Their machinery and other equipment was all 'Made in America', and that may partly account for their success.

My last foundry experience before leaving Sydney was in a jobbing shop. Here, as in most jobbing shops, they made everything from 'a needle to an anchor'; but one job in particular that drew my attention was a large match-plate containing sewing-machine patterns. The two upright castings, the pedal, and the large wheel were cast in one mold. The plate was made of cast-iron ½ in. thick, and, needless to say, was heavy. A special facing was prepared for these molds, containing a large proportion of marble-dust. As a result, the castings came out of the sand clean and shiny and almost as smooth as glass. I was told by the foreman that this facing could be used effectively on almost any kind of mold, by simply

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increasing the amount of marble-dust according to the weight of the casting and that excellent results could be obtained.

During my sojourn in New South Wales I spent six months in touring the 'Bush'. The term 'Bush' in Australia means anywhere outside of a city. You may be in a valley, in the mountains, on a sheep station, or among the mines, but it is all known as the 'Bush'. My experience here was even more interesting than in the foundry, and I could not help but realize what wonderful opportunities lay in store for the man with money and brains. The mines are all badly in need of up-to-date machinery, and the tractor is a luxury seldom seen on an Australian farm. Australia will undoubtedly have a large influx of population during the next few years, and machinery will become more and more a necessity in every kind of industry.

And now just a word regarding the mineral resources. Australia has an unlimited supply of iron ore. The principal mines are at Port Pirie, South Australia, on the Spencer gulf. According to W. M. Hughes, prime minister of the Commonwealth, the ore is of the best quality. Previously this ore has been shipped to Europe, and there converted into steel products, but owing to the exigency created by the War, this became an impossibility, and the immediate demand for steel, caused by the huge shipbuilding scheme commenced by the Government, has supplied an incentive to the Broken Hill Proprietary Steel Co. and G. & C. Hoskins, iron masters of Australia, to embark upon the enterprise of steel-product manufacturing.

In Newcastle and the northern district of New South Wales is one of the most productive coalfields in the world. However, excellent coal can be found in almost any part of the Commonwealth and the supply is inexhaustible. In view of the great wealth in coal, iron, and limestone possessed by the Commonwealth, its success in due time, as a manufacturing country should be assured.

In concluding, I will touch lightly upon the labor situation by mentioning the 'Beeby Act'. This law has had an important bearing on the industrial affairs of New South Wales, and was passed as a result of an industrial upheaval during the year 1917. This bill curtails the power of the labor unions to call a strike without giving due notice both to Government officials and employers. It practically eliminates opportunities for extreme action on the part of the unions, and there are heavy penalties imposed for violation of any of the provisions.

Mr. Beeby, who drafted the bill, is at present a Member of Parliament in New South Wales and is also Minister for Labor.

Various foundrymen with whom I have talked have expressed the same opinion, namely, that a successful future for the Australian foundry depends largely upon two things: first, American capital; and second, American ideas.

A Vigilant Inspector

A rather amusing incident happened not long ago in a plant under my jurisdiction. An experiment with titanium was to be carried out, of which I was informed by the manufacturer, having been party to a discussion on the matter, and, as is usual with us, all the cards were on the table. I did not say a word to any subordinates until after the event, then inquired for the daily open-hearth inspection report. The daily inspection report was produced and I found opposite the correct heat-number a note as follows: "50 lb. Plat.," and, after finding the examiner who made out the report, asked him what this meant, and he stated "50 lb. of platinum put in the ladle." I asked him how he knew, and he said he "saw it going in and asked the open-hearth man and he said it was platinum." Of course, the whole thing was ridiculous as well as amusing, but the main fact so far as I was concerned was that the man was on his job so far as he knew and certainly saw that they did put something in the ladle, and reported it. Had I not known what the material was and had the relationship been different between ourselves and the firm, we should have known something unusual had gone into the ladle and endeavored to find it through the Chemistry Department. —John T. Marsh in 'Journal' of the Cleveland Engineering Society.

Plans Adopted for Handling Surplus Government Machine-Tools

At a meeting held on January 16 at the office of the C. W. Hare, director of sales for the War Department, and attended by representatives of the machine-tool companies throughout the country, the following plan was adopted, by which it is hoped that the various industries can absorb within a reasonable time all the surplus Government-owned standard machine-tool equipment without being seriously disarranged:

1. The inventory of all machine-tools and equipment that is being made will be expedited to the greatest possible extent.

2. As soon as it is known that a quantity of machine-tools is available for disposal, the manufacturers of these tools will be given an opportunity to purchase them at a price and on terms of settlement that will be satisfactory to all parties concerned.

3. In case it is impossible for the manufacturer to purchase his product outright, an effort will be made to arrange for the marketing of the product by the manufacturers in an equitable manner, securing for the Government and the manufacturer alike the best possible terms.

4. In case both these methods of disposal fail, the material will be offered for sale to the general public.

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Core Mixtures

By W. W. MILLS*

IN practically every State or locality they have a different way of mixing core-sand. This is due to the fact that the character of the sand varies. Therefore it is out of the question to set a universal standard. There has been a great deal of discussion in the San Francisco Bay district about core-sand, core-binders, and how to mix them to obtain satisfactory results. Shops try to make one kind of sand do for all classes of work. This cannot be done with satisfactory results. What the founder wants is a core that will stand the strain of handling, will vent readily, and can be cleaned from the casting with as little labor as possible.

Good results can be obtained if the following rules are observed.

1. The core-sand should be thoroughly mixed. Do not expect to get a good core with any mixture if this rule is not followed.

2. Heat is an important factor, as you can see from the tables accompanying this article. If a core is not dry when put in the mold, the heat from the iron will finish baking it, consequently it will be hard to get out of the casting. On the other hand, if the core is dry when put into the mold, the additional heat from the iron will burn the binder out of the sand, leaving the core soft. In very large cores, where the metal is not thick enough to burn the core completely, sawdust and lubricating oil should be added to the sand to make it burn more readily.

The following mixtures are used in my work, and I have found them satisfactory:

Mixture No. 1

40 parts white sharp sand
1 part linseed oil.

This mixture is suitable for castings where the iron has a chance to eut or burn in the core. This core has a transverse strength of 46 lb. when tested with a core 1 in. square, the core being broken on supports 6 in. apart. This core was baked at a temperature of 450° F. This sand should be worked fairly wet. Cores 1 in. square by 6 in. long made of this mixture and baked at different temperatures showed the following breaking strengths:

Temperature, Fahrenheit	Breaking strength, pounds
275°	6¼
350°	14
450°	46
475°	28

Mixture No. 2

60 parts white sharp sand
1 part linseed oil.

Tempered wet and mixed thoroughly, this mixture can be used for all kinds of gas-engine work. This mixture has a transverse strength of 37 lb., using a core 1 in. square, broken on supports 6 in. apart. This core was baked at a temperature of 450° F. The results at other baking-temperatures are as follows:

Temperature, Fahrenheit	Breaking strength, pounds
275°	3¾
350°	11
450°	37
475°	22

Cores made of this mixture can be used with little or no venting.

'Kordek' Mixture

1 part new molding-sand
3 parts old sand
1 part heavy sharp sand
1 to 14 of sawdust
1 to 60 of 'Kordek'.

This mixture when thoroughly worked will not cut or scab. It will clean readily from the casting and makes a fairly strong core when baked at a temperature of 350° F. When it is baked above this temperature the cores have a hard exterior and a mushy centre. Different tests show these results:

Temperature, Fahrenheit	Breaking strength, pounds
275°	4
350°	13
375°	9

This mixture is for heavy cores.

'Compound' Mixtures

1 part new molding-sand
3 parts old core-sand
1 part sharp sand
1 to 14 of sawdust or coal-dust
1 to 40 of compound.

This mixture is for large cores. It cleans readily from the casting. Bars 1 in. square and 6 in. long show these results:

Temperature, Fahrenheit	Breaking strength, pounds
275°	3¾
350°	12
375°	8

Clay Mixture

1 part new molding-sand
1 part old core-sand
1 to 14 of sawdust
Wet down with clay wash
Bake at a temperature of 350° F.

This mixture is used for heavy work but will not stand rough handling. It cleans readily from the castings.

All of the above mixtures have been tried in practice, and careful records have been kept of all tests and heats. They have been used to good advantage in the shops where I have worked, and have proved satisfactory in the making of good castings.

*Phoenix Iron Works.

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Foundrymen's Club

The Last Meeting

In spite of the prevalence of the 'Flu' and the disquieting rumors about the use of masks, the January meeting of the Club was an unqualified success. The Club orchestra led by W. F. Koch was in good form and the musical program rendered was the best yet given. Frank Kramer, vocalist and community song leader, sang several solos that were fully appreciated by all present.

Clarence E. Ralston, safety engineer at the Mare Island Navy Yard, presented an instructive address on 'Foundry Safety and What It Means to You'. In his address Mr. Ralston gave illustrations that have come to his personal attention showing the value to each man of the extreme care necessary in foundry work.

The discussion on 'Mixtures for Small Cores' brought out some interesting points regarding the making of brass, ga engine, machine-made stock, steel, and other small cores. These mixtures are given in another column.

Al Snow and his faithful bunch of sandwich-passers came back in all their glory and furnished a fitting close to the evening program. The change of refreshments seemed to take well, for the janitors of the hall report that there were no crumbs left.

The crowd left at the usual time well pleased over the evening entertainment. JOE.

The Next Meeting

The charges are all on the platform for the 'Cupola Discussion' to be held at the next meeting, on Thursday evening, February 20, in Yosemite hall, Native Sons building.

Column-charging is the particular method to be studied at that time. The committee on cupola investigation has been to the shop using this method of charging and have prepared a fine report to open the discussion.

W. W. Ellis will explain his discoveries regarding the 'Heavy-First Charge', giving you the why and wherefor.

Maurice Greenberg is to give a snappy talk on 'Brass Molding'.

W. F. Koch has promised that the orchestra is going to outshine all previous programs.

The community sing will be melodious if you all sing.

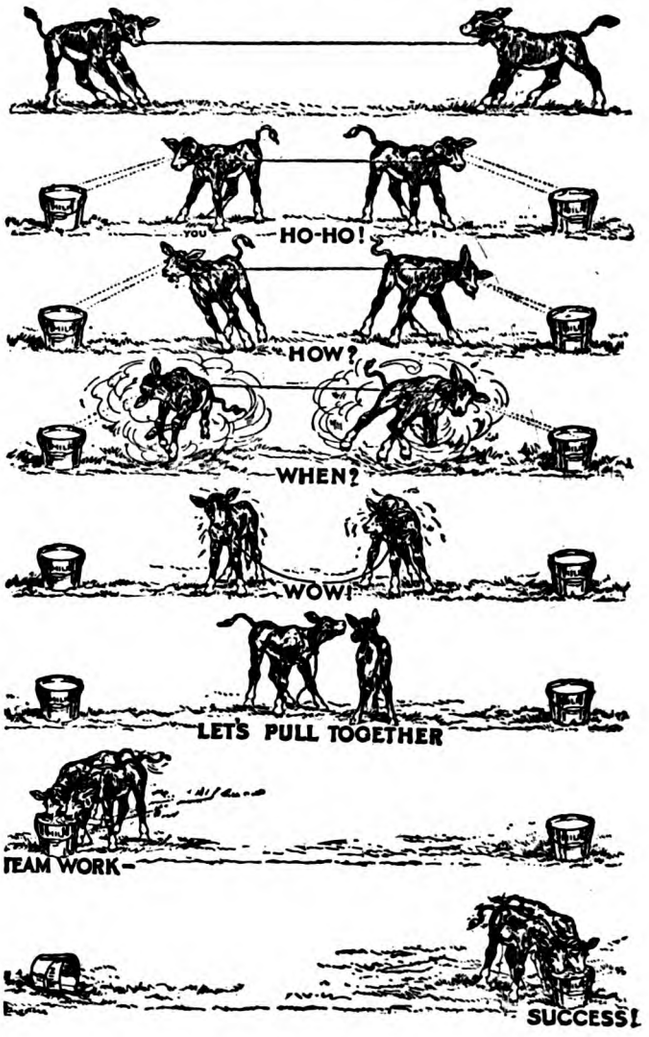
The refreshment committee has a little surprise for you, but it will be good.

You will enjoy the evening.

WITH the country going dry, the market for suit-cases is bound to decrease.

Co-operation

One of the leading business men of our country has said that the way to spell co-operation is with two letters, 'W-E'. Every business, every association, every club, and in fact every organization needs to spell it that way. The trouble with many an organization is that its members speak of it in the third person, and say 'they', 'them' and 'theirs', and because they speak and think in that fashion, they act as though the organization to



which they belong was something outside of them and their interests.

The organization is always spoken of in the third person when people wish to criticize it. They detach themselves from the body of which they are members, or at least should be, and proceed to tell what 'they' do and what 'they' ought to do.

The Foundrymen's Club of California is a 'W-E' organization. Its membership is composed of men who are all vitally interested in the same thing, namely, 'the making of good castings'. There has been none of the 'they' spirit evinced in the past history of the Club, but we should all beware lest the 'star' or 'individual' play take the place of the more vital teamwork.

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The Molander System of Cupola Linings

AT a recent meeting of the Foundrymen's Club, D. Molander of the H. C. Macaulay Foundry Co. of Berkeley gave an interesting talk on the results of his discovery of a new method of lining a cupola in the melting-zone. This method, which has been used by the Macaulay foundry for a number of years, has proved a great success in cupola practice.

Mr. Molander presented the method, together with instructions and drawings, to the Club, so that the members might avail themselves of its use. After a careful investigation by members of the Club, this method has been found to be as represented, and to be an important step in the improvement of cupola practice. When the cupola is lined according to the instructions presented by Mr. Molander some interesting new features in cupola operation are found that are a great improvement on the old system.

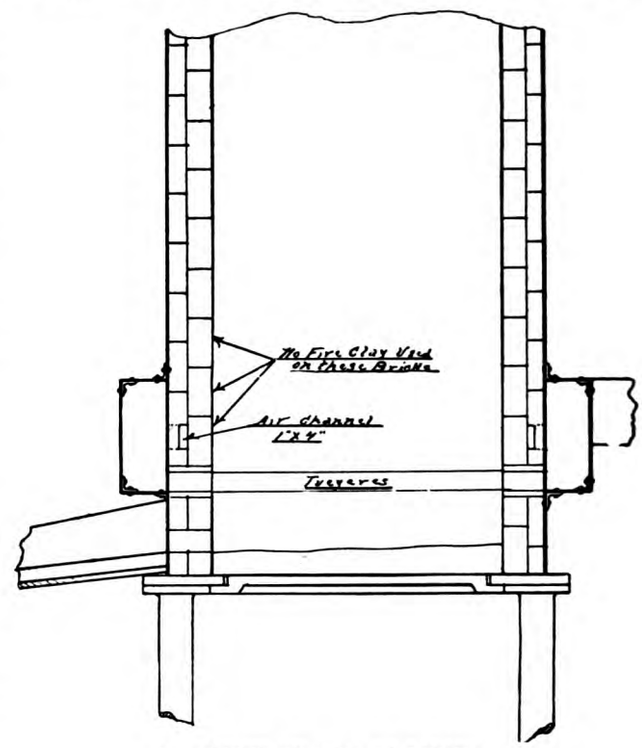
No fire-clay or any other kind of clay is used in the melting-zone, consequently, there is no need of a daily patching as is customary when using the old method. Mr. Molander places the bricks and applies the air in such a manner in the melting-zone that the extreme heat does not have much effect on the lining. A saving of 50% on bricks is obtained with the new system of lining as compared to the old. Another unusual and beneficial feature of this method is that no flux is used for slagging purposes during the first three hours run. This gives a great saving in the labor required to clean the cupola and keep it in shape.

The Molander method is simple to install after one becomes accustomed to it, and it is adaptable to all sizes of cupolas. There is no extra expense in the installation, as no material is required except the fire-brick commonly used for lining purposes. It can also be used without changing the existing tuyere system, unless a change is desired for other reasons.

In order to get the best results from a cupola, the volume of air is the most important consideration, rather than the pressure, as is the belief of most melters. A five-ounce pressure will melt iron as rapidly and more economically than fifteen ounces. Large tuyere areas and low pressure should be used, the ratio of the tuyere area to the cupola area being about one to three.

There are firms using the Molander system that melt iron at a coke-ratio of 1 to 15, not including the bed. At the beginning of the heat, establish the amount of coke required, then regulate the air to give the proper combustion. The more coke used, the more air is required to melt the same amount of iron, as the excess air takes the heat from the stock and you find flames at the charging-door. These flames at the charging-door indicate that too much air and coke is being used. If there is the right proportion of coke and air in the melting-zone, there should be no flame at the charging-door, or if there is any flame at all, it should be sky-blue, indicating a successful heat.

The melting-zone of the cupola is the point where the iron melts, and it should be given the strictest attention. The old method of packing and daubing the lining has seen its day, when you stop to consider that the more bricks, clay, and flux put into the melting-zone, the more trouble proceeds therefrom. When hot, the clay and bricks expand and pop out, dropping over the tuyeres, and eventually closing them. The cupola then ceases to



MOLANDER SYSTEM OF LINING

give satisfactory results and the melter wonders why. In the Molander method of lining, the bricks will stay in place until they have burned away to ¼ in. thick.

The merits and economy of Mr. Molander's method place it far ahead of any method that has so far been introduced. This method should be adopted by the members of the Club as well as foundrymen elsewhere, for it means better results in cupola practice. Anyone who is interested in this method can secure drawings and complete instructions, by writing to the manager of the Club, or to D. Molander, 1124 Carlton street, Berkeley.

"EF yer goin' to tie a brick on th' cow's tail in fly-time," remarked Uncle Wiseacre, rubbing a large bump on his head, "be sure t' use a heavy one that she kaint swing!"

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Core Mixtures Used at Bay District Foundries

By H. WIEMANN

THIS is a report presented at a meeting of the Foundrymen's Club of California held on January 16. Mr. Wiemann was chairman of the committee making the investigations.

A VISIT to the C. L. Best Gas Traction Foundry found Mr. Ellis, foreman, and Mr. Luscher, foreman of the core-bench, vitally interested in the making of cores. In this core-room, mixtures have been studied for a long time, for they have found that in the core is one of the leaks of the foundry profits. The mixtures given below are the result of the study of many different formulas:

LINSEED-OIL MIXTURE

1 part linseed oil,
60 parts of white Monterey sand.

This is thoroughly mixed by hand twice and is then riddled twice in an air-driven riddle. It is worked moderately wet. The cores made from this mixture require no special venting and are made quickly because no ramming is necessary. The boxes are simply jarred on the bench and the result is a good solid core. The cores are dried every night in coke-ovens. This mixture is used for gas-engine cylinders and housings and, in fact, in all the larger gas-engine castings. If the castings are heavy, the cores are blackened, but many of them are put into the mold without any blackening whatsoever. The chipper reports that the cores run out of the castings like powder, presenting no difficulty in cleaning.

IMPERIAL-OIL MIXTURE

1 part Imperial oil,
35 to 40 parts of white Monterey sand.

This is mixed in the same way as the linseed cores. Its only advantage over the linseed mixture is that it dries much faster. These cores are simply jarred into the boxes in the same manner as those made from the first mixture. The second mixture is used for the smaller gas-engine cores that require quicker drying

STOCK-CORE MIXTURE

1 part linseed oil,
60 parts white Monterey sand,
A small amount of flour.

This is mixed with a shovel and riddled by hand. It is used in making all machine stock-cores.

CRUDE-OIL MIXTURE

1 part heavy crude oil,
18 parts gangway sand from shop and core-room floors.

This mixture is used in the top and bottom cores for chilled rollers, where the metal touches only one side of the core. These cores present no difficulty in cleaning, for they are almost entirely shaken off the casting when removing casting from the mold.

At the Best Steel Casting Co., Andrew Hoffman was found to be an ardent advocate of crude-oil cores, and, in fact, no other mixtures are used in this shop for the many and varied steel castings made there.

The mixture for the smaller stock-cores made in boxes is as follows:

2½ wheelbarrow loads of equal parts of floor sand and white Monterey sand,
1 gallon crude oil.

This is worked moderately wet, and in many cases is rammed into boxes without the use of rods or other strengthener. These cores are made green and are set on end on shelves in the core-oven for drying. They are dried over night and then are set on end on the core-storage shelf. The chipper reports that they are easily removed from the castings.

For the larger cores the mixture is as follows:

28 shovelfuls white Monterey sand,
10 shovelfuls floor sand,
1 gallon crude oil,
2 shovelfuls fire-clay.

This is mixed moderately wet and dried over night. They find that, contrary to ordinary belief, the fire-clay and crude oil will not mix. No arbors are used in the large cores, but they are strengthened by the use of pipes properly bent and placed.

One core in particular was noticed. It was for a 30-in. bent pipe 13 ft. long with a 12-in. offset. The core was made with the above mixture and strengthened by the use of five pipes properly bent and placed.

Cores made with this mixture can be rolled over and subjected to ordinary handling without danger of breaking. The chipper reports that they can be removed from the casting easily.

STOCK-CORE MIXTURE (made in machine)

1 part crude oil,
35 parts white Monterey sand.

This is mixed by hand and is used for all machine-made stock-cores in all sizes. It gives satisfactory results. They find that a slow fire is best for drying all of the above mixtures.

A trip to the Enterprise Steel Foundry showed that

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they too had been making a particular study of core mixtures, and the following mixtures have been used for some time with excellent results.

4 parts Monterey sharp sand,
4 parts silica sand.

This is mixed thoroughly and the following mixture is made:

1 part of linseed oil,
35 parts of the above mixture.

This mixture stands up well while drying and is used in pipes, tractor-cases, or in fact in any core of any size. Not much rodding is required and the cores can be removed from the casting easily.

The second mixture is peculiar to a shop with an electric furnace. They take the bottom sand from the furnace and make the following mixture:

45-gallon cans of ground return furnace-lining,
1-gallon can fire-clay,
1-gallon can sawdust.

This is thoroughly mixed in the following proportions:

1 part linseed oil,
35 parts of the foregoing mixture.

This mixture requires considerable rodding, but it produces a core that is strong enough to withstand the heat of the electric steel. As a sample of what it will do we give two illustrations. In a 3000-lb. casting, the gate-cores, 1 in. thick, were placed between the gate and the casting, and, after pouring the piece, the cores were easily removed by a slight scraping with the core-maker's trowel. In another instance a 1¼-in. round core 20 in. long was placed in a pile-driver hammer weighing when cast approximately 750 lb., and a 1¼-in. clean hole was obtained. The core came out easily.

The Enterprise Foundry Co., 19th street works, use the following mixtures for stock-cores; ⅜-in. cores are made of

20 parts sharp sand,
1 part flour,
1 part linseed oil.

½ to 1½ in. diam., use 20 parts sharp sand, 2 parts flour, 1 part linseed oil.

1½ to 2½ in. diam., use 55 parts sharp sand, 7 parts new sand, 7 parts flour, 3½ parts linseed oil.

2½ in. and larger, use 77 parts sharp sand, 8 parts new sand, 9 parts flour, 4 parts linseed oil.

For medium and small bench-cores they use 35 parts sharp sand to 1 part Excelsior core-oil.

Pacific Foundry No. 2 was using crude oil, 1 part to 16 parts of sharp sand mixed twice through a power-riddle. Pacific Foundry No. 1 was using for general work 20 parts sharp sand, 20 parts new sand, and ¾ part Kordek.

Kingwell's Brass Foundry has a good mixture for cores surrounded by a heavy section of brass, namely, equal parts of sharp sand, Alvarado sand, 1 to 14 of flour, and 1 to 10 of plumbago. For medium work, 35 parts Monterey sharp sand to 1 part of No. 3 Herring oil. Another mixture for general work is 6 parts sharp sand, 2 parts Alvarado sand, and 1 to 35 of Kordek. If heavy, use 1 to 30 of Kordek.

The Phoenix Iron Works uses one part new sand, one part of sharp sand, one part sweepings, etc., and 1 to 50 Kordek. This mixture should be baked well.

The H. C. Macaulay Foundry Co. uses the following mixture for small cores: 1 shovelful of barley flour to 7 shovelfuls of sharp sand, or 1 shovelful of wheat flour to 8 shovelfuls of sharp sand. They use a coreline mixture for small core work as follows: 1 pint of dry coreline to 36 pints of Gallagher sharp sand, with 1 to 120 of raw linseed oil. Mix well. This mixture is to be used in place of the flour mixture. It should be mixed slightly wet. An oil-sand mixture for small core-work contains 1 pint of raw linseed to 60 pints of Monterey sharp sand. Use a little wet, and mix well. For common core work, such as ells, tees, and 'chunkey' bricks, they use an oil called 'paint oil'. Take 2 parts paint oil to 1 part raw linseed oil and mix the oils. Then add sweepings from the floor, 2 parts sweepings to 1 part sharp sand and mix 1 to 60. This mixture will make fine cores, and will not cut or blow.

Mixture No. 1 at the United Iron Works, Oakland, is composed of crude oil and burned sharp sand returned from the foundry; proportions 1 to 25. Mixture No. 2 is 1 part core-oil to 40 parts of new sharp sand. The first mixture is used in small cores up to 12 in. diam. and also in making miscellaneous fitttings.

He Didn't Care

Ezra Jackson, justice of peace in Plumville, was returning home from Chicago on the accommodation train, minding his own business and looking out at the scenery when the conductor came along and said:

"You'll have to take that grip off that seat."

"I guess I won't," said Ezra.

"I guess you will," returned the conductor. "It's against the company's rules to have baggage on the seats."

He went away. Ezra looked at more scenery. The conductor came back.

"I told you to take that grip off that seat," he said.

Ezra ignored him.

"I'm not going to argue with you," the conductor went on. "If you don't take that grip off that seat by the time I come back again, I'll throw it out the window."

He went away. Ten minutes later he came back. The grip was still on the seat. He threw it out the window. The train was going forty miles an hour.

"There," the conductor exclaimed triumphantly, "I told you if you didn't take that grip off that seat I'd throw it out the window."

"I don't care," drawled Ezra. "It ain't mine."—'Highway Magazine'.

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Review of the Accomplishments of the Commissioner of Scrap Iron and Steel for the Pacific Division

An Appreciation Written at the Direction of the California Foundrymen's Association

THE iron and steel industry of the Pacific Coast division should thoroughly appreciate the efforts and accomplishments of Emory E. Smith, commissioner of scrap iron and steel, and his assistant, J. D. Stephens, who have so ably enforced the Government regulations as to price control applying to this material in the Western Division, and in addition have stabilized local raw-material conditions and assisted the various Government departments in the completion of urgent war orders.

W. Vernon Phillips, chairman of the subcommittee on scrap iron and steel of the American Iron and Steel Institute, who was subsequently made chief of the scrap iron and steel section of the War Industries Board, operating under B. M. Baruch, chairman, and J. L. Replogle, director of steel supply, was so overwhelmed with work in the eastern and central part of the United States, and the Pacific Coast division was so remote, that he appointed Emory E. Smith, of San Francisco, to enforce regulations in the West for him, and the appointment was confirmed by the American Iron and Steel Institute. It was soon found that the iron and steel business of the Pacific Coast, due to extensive Government contracts, had far exceeded the facilities of the mills and foundries, and that the entire division had been practically depleted of its natural source of supply of raw material. Due to this condition, control of the situation in the Western Division, composed of the States of California, Oregon, Washington, Nevada, Utah, Idaho, Montana, Wyoming, Arizona, Colorado, New Mexico, and western Texas, insofar as the regulations applying to iron and steel were concerned, was left almost entirely under the personal supervision of Mr. Smith, and his assistant.

At the time Mr. Smith was appointed he found that the foundries and steel-mills were running from 'day to day' or 'hour to hour' on such supplies as could be accumulated locally, and that it would be necessary for a large amount of material to be brought from a long distance. Within three months about twenty-five thousand tons of scrap iron alone was brought into the division from the Middle West for Government foundry work. Steel-mills were only a little better off for steel scrap than were the foundries for cast-iron. While a small amount of scrap iron and steel can still be found in this district, it was practically impossible under Government price-regulations to make it available for immediate use. Owing to the fact that Government orders throughout the country were short millions of tons of the required amount of pig-iron, it was necessary to depend upon scrap iron and steel as a source of supply to a much greater degree than would ordinarily have been the case, a fact which had a large share in elevating these commodities to national recognition and supremacy. In order to have the proper co-operation and advice on the different problems in the division under his control, Mr. Smith appointed A. F. Pillsbury, district manager for the U. S. Shipping Board, C. O. G. Miller of the War Trade Board, J. Q. Brown of the division of production of the Emergency Fleet Corporation—representing Government departments, C. M. Henderson, representing gray-iron foundries, H. H. Whiting, representing steel-casting plants, W. L. Booth, representing steel rolling-mills, and William H. McDaniel, representing the scrap iron and steel dealers, as an advisory board in San Francisco, and also appointed advisory committees in Seattle, Portland, Los Angeles, and Denver, composed of the leading Government war officials and the leading men of the iron and steel industries. Both the advisory board and the committees met once a week to discuss matters of im-

CALIFORNIA FOUNDRYMEN'S ASSOCIATION
Underwood Building—Phone Sutter 4250
San Francisco

December 31, 1918.

MR. EMORY E. SMITH,
Comissioner Scrap Iron & Steel,
San Francisco, California.

Dear Sir:

On behalf of the membership of the California Foundrymen's Association, I wish to extend to you our thanks for the effective work done by your Commission, during its existence, in keeping this community supplied with scrap iron material.

We fully realize the difficulties which you had to encounter, in the enormous task which this undertaking involved. But considering results, you achieved the apparently impossible in the face of economic difficulty.

Your accomplishments take on a deeper significance when we remember that your efforts were spurred on by motives and ideals which were purely patriotic, and that they were attended by great personal sacrifice.

We take this opportunity to express our appreciation.

Very truly yours,
CALIFORNIA FOUNDRYMEN'S ASSOCIATION.
D. GUILD, JR.,
President.

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portance and to co-ordinate the work. Regular weekly reports from the iron-foundries, steel-mills, and scrap-iron dealers in each district, giving details of transactions, were made to the local advisory committees, and these were forwarded to the commissioner's office in San Francisco, where they were tabulated. The information thus gained proved invaluable in handling the situation and unifying the work. The California Foundrymen's Association of San Francisco, the Founders' and Employers' Association of Los Angeles, and the United Metal Trades Associations of Portland and Seattle and all the steel mills in the division rendered hearty co-operation, and materially assisted in the work of this organization.

As soon as the acute shortage of scrap iron and steel was relieved, it was found that very little pig-iron was available for the Western Division. Mr. Smith went to New York, Washington, and Philadelphia, bearing information in condensed form regarding the requirements of the division and spent six weeks presenting the matter to the proper authorities. So effective were his negotiations that the authorities laid down the rule that any request for pig-iron on the Pacific Coast when recommended and approved by the commissioner should be immediately allocated and shipped, without delay for correspondence, Mr. Smith becoming personally responsible for the material being used only on urgent Government work. The impetus given to the much-needed pig-iron shipments by his visit East quickly started thousands of tons of iron westward. In addition to pig-iron supplies, the privilege was secured from Mr. Phillips to draw unlimited supplies of cast-iron scrap from all States west of the Mississippi river, and from the extreme South. The thousands of tons thus secured tided the industry over another crisis. The work also necessitated a great deal of traveling on the part of the commissioner throughout the district in order to look after the details properly, and to settle controversies in the different localities under his control. When he was absent from San Francisco the work of the office devolved upon his assistant, J. D. Stephens, who, like Mr. Smith, devoted his entire time and energy to this cause as a so-called "dollar-a-year-man."

It is hard to realize the magnitude of the work of the commissioner's office and its accomplishments, but it should be remembered that the shipbuilding and other Government war work on the Pacific Coast within the war period has proportionately exceeded in value and speed of delivery that of any other district in the United States. The weekly report of one plant alone showed orders for approximately 140,000 tons of finished products.

The capacity of several foundries has increased from a normal output of a few hundred tons to one thousand tons per month. As to the class of work being done here it might be mentioned that one concern in California has been working on orders for a number of 2800-hp. marine engines, in addition to many smaller marine engines, boilers, condensers, and other equipment.

Even though the Pacific Coast was the most remote district from the seat of war, a large amount of orders were filled here for our Allies. The war work in this district comprised castings for the Spruce Division, which furnished the timbers for the wooden ships and aeroplanes, castings for the Bureau of Aircraft, supply orders for the Food and Fuel Administrations and Navy Department, rails, car-wheels, and cars for the United States Railroad Administration, rails for the American Expeditionary Forces in France and the Italian State Railroad, projectile steel, barbed and plain wire for France, parts for the war-tanks, and with the exception of the steel plates practically all steel and cast-iron for the war and merchant ships built on this coast, in addition to a large amount of work for other government departments. Within the district there are nine large steel-plants, twelve electric-furnace plants, eight steel-casting plants, about two hundred gray-iron foundries, and about five hundred scrap-iron dealers, all engaged almost entirely on war work.

In order to prevent delays in supplying shafts for ships under construction, Mr. Smith has assisted in educating the mills in this district to turn out ship-shaft ingots of the largest size up to a capacity of three thousand tons per month. The scrap steel alone used in one plant in California has been approximately 100,000 tons per year. Under these conditions it has been only through the greatest efforts of the Scrap Commissioner and his organization that material was made available so that the plants were kept running at full capacity, and Government orders promptly and properly completed. Hardly a plant was forced to cease operations on account of not having the proper amount of supplies. Material being brought into this district has been diverted en route by Mr. Smith's office from one plant to another in order to help those in dire need, and even car-lots were sometimes split into several parts. The advisory committees were in daily telegraphic correspondence with the San Francisco office. Only through this organization quietly perfected and quietly conducted by Commissioner Smith has the war program of the Pacific Coast been successfully carried out.

All fines collected for the violation of price and other government regulations have been donated through the American Iron and Steel Institute to the Fund for the Widows and Orphans of American soldiers killed in the War.

The proper enforcement of the laws and regulations applying to scrap iron and steel was much simplified by the assistance of W. Vernon Phillips, director of iron and steel scrap, the War Industries Board, officials of the U. S. Shipping Board, and the War Trade Board, who co-operated fully with the San Francisco office.

It is impossible at this time to go into detail and cover all the obstacles, interferences, and near-tragedies that the commissioner's office had to face, and the entanglements that had to be unraveled, but suffice to say 'that the impossible was accomplished' and that practically all difficulties were surmounted and successful results obtained. Inasmuch as all departments of the Government

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virtually depend upon iron and steel, the industry, as well as the various Government departments in this district, should be deeply indebted to Mr. Smith and his assistant, Mr. Stephens, for their untiring work in behalf of the Government. Mr. Smith and Mr. Stephens have both received many letters from Government officials, and others in a position to know of their work, both in the East and in the West commending them for the degree of efficiency attained in the undertaking.

It is particularly gratifying to know that San Francisco has again met the emergency with citizens who have loyally given their time and energies to their country and their city in time of need and so say we—"All honor to you, Messrs. Smith and Stephens, and may you remember your experience with pleasure in thoughts of a good work well done and the grateful appreciation and respect of the metal trades. Good-bye and good luck."

CALIFORNIA FOUNDRYMEN'S ASSOCIATION.

Obituary

Frederick Townsend, of the firm of Woods, Huddart & Gunn, died January 19 at his home in San Francisco. He was also president of the Pacific Coast Numismatic Society.

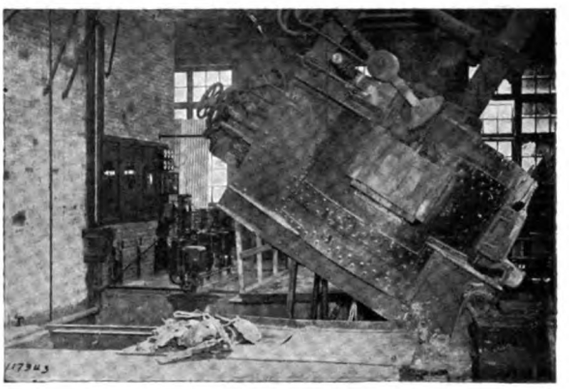
Frank Baird died January 16, after a short illness. Mr. Baird was a graduate of the University of California, and was for several years metallurgical engineer for the Penn Mining Co. In 1908 he went to work for the Pacific Foundry Co., and until his death had charge of the manufacture of the special appliances made by the company.

Rolla C. Carpenter died at his home in Ithaca, New York, January 19. He would have been 67 years old on June 26. He was professor of experimental engineering at Cornell University from 1895. Almost from his earliest days in this capacity he stood apart from most of the teaching staff of Sibley College, as well as other technical schools, in that he was widely regarded as having a close contact with outside affairs, and his instruction on the theory of engineering was therefore tempered by the practical conditions of the industrial world. Successively he gained authoritative positions in the field of the steam-engine, in heating and ventilation, in cement manufacture, and in the automobile field. He contributed papers to the societies devoted to these branches of engineering, incorporating much of the experimental information he gathered through his private commercial tests and through the work of engineering students. Besides numerous papers, he was the author of books which have remained as standard authorities and as text books, including 'Experimental Engineering,' 'Heating and Ventilation', and 'The Gas Engine'. The list of technical societies of which he was a member is long and includes the national societies of civil, mechanical, and mining engineering, heating and ventilating engineering, refrigerating engineering, and automotive engineering. He was a member of the American Society for Testing Materials and of the Engineers' Club of New York. He was graduated from the University of Michigan in 1875, and after a brief experience in railroad construction on a branch of the Michigan Central railroad he joined the instruction staff of the Michigan State Agricultural College, where he began his heating engineering in designing the central-station heating plant for that institution. He served as an engineer for New York for the high-pressure fire pumping-plant in that city in 1911.

INDUSTRIAL EQUIPMENT

THE PERFORMANCE AND EQUIPMENT OF A TWO-TON ELECTRIC FURNACE

An electric furnace, whose main product is nichrome, the well-known high-temperature resisting alloy, has recently been completed at the plant of the Driver-Harris Co., Harrison, N. J. The furnace is of special interest because of its electrical equipment, which is an excellent example of modern practice. Alloys of various characters are also manufactured by the furnace. It is of the Heroult arc-type, with automatic regulation, and has a capacity of two tons.



Furnace and Mechanism for Tilting

These graphs show clearly the operation of the furnace. The amount of power taken at the start of the heat is small, but as the resistance of the furnace circuit decreases, owing to the heating of the electrodes and the consolidation of the charge, the power consumption rapidly increases until stable conditions are reached. The average amount of power consumed is then held practically constant by the automatic regulator, with the exception of a slight continuous increase due probably to a corresponding decrease in the resistance of the furnace circuit.

Pouring Into Molds

Toward the end of the run there is a marked change in the power consumption when the metal is given a special treatment before pouring.

One of the most interesting features of the equipment is the Thury regulator, which automatically maintains an approximately constant current at the furnace electrodes. Without this device the current consumption would vary erratically even if an operator were constantly endeavoring to correct the variations. It therefore saves labor and cur-

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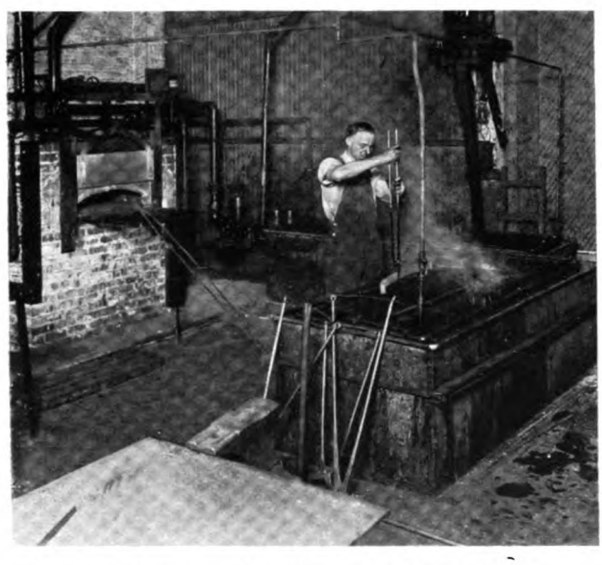
rent, reduces to a minimum the time required to prepare a charge, and by providing uniform conditions, keeps the quality of the product uniform.

Each furnace electrode has a separate regulating mechanism and a raising and lowering motor. The regulator can be set for any desired current value and when this value is exceeded, each regulating mechanism closes a contact momentarily which causes the motors to raise the electrodes slightly. The contacts continue to close at brief intervals until the electrodes are drawn high enough to reduce the current to the predetermined value, the intermittent action being employed to prevent the electrodes from being raised too high and thus causing an unstable condition. When the current falls below the predetermined value the electrodes are lowered in a similar manner. The regulator itself is controlled by a solenoid energized by means of current from series transformers in the main high-tension circuit. Damping devices prevent the regulator from acting on overloads that immediately correct themselves. In addition to the automatic device, each electrode motor has a drum controller for manual operation.

All of the equipment consists of standard Westinghouse furnace apparatus.

MAKING AND TEMPERING AUTOMOBILE SPRINGS

In the manufacture of a spring much depends on the quality of the steel but even more important is the heat treatment by which the spring temper is obtained. It is the care and scientific accuracy of the methods of tempering used by the Hoover Spring Co. that permits the delivery of a uniform high-grade product. The company is not on a



Tempering Springs, Furnace in Background

manufacturing basis but confines itself to making springs to order. Most of the work is for motorists that have suffered an accident. There are enough of these accidents, however, to keep 25 men busy.

Two grades of springs are made. For the first grade a chrome-vanadium steel is used but as this is a relatively expensive material, a second grade is also made from an ordinary steel with approximately 0.90% carbon. Both grades are manufactured by the Holcomb Steel Co. in small electric furnaces. Mr. Downing, manager for the Hoover Spring Co., states that this process gives a purer more uniform steel and that he can produce a much finer grain in it than in steels made by other processes.

The steel is first forged to the proper shape and quenched in oil. It is then placed in a comparatively cool furnace and gradually heated. The exact temperature for both this and the second heating is determined by trial for each new batch of steel until the test-pieces have the proper structure and stand up under the mechanical tests. The furnaces are kept at this temperature after it has once been determined. For the first heating the temperature is about 1650° F., or a bright red heat. The steel is then quenched in oil. It is now fine-grained, but very hard and brittle. The temper is then drawn by heating the steel in another furnace to about 950° F. and cooling in the air. The spring is still fine-grained, but is tough instead of brittle, and has a long fibre-structure that gives resiliency. In order to eliminate the error caused by estimating the temperature from the color, each furnace is equipped with a pyrometer and the furnace is brought to exactly the proper heat. This permits the exact duplication of the best conditions. The pyrometer eliminates the personal equation, and such factors as the time of day, clouds, and even the digestion of the operator, all of which influence the results when the temperature is judged by color.

The equipment includes six gas-fired furnaces, four by six feet inside, which are designed so that the flame does not come in contact with the steel. A Selas gas-mixing system is used. It makes a good mixture and permits satisfactory heat-control. Although gas is more expensive than oil, it is cleaner, more easily regulated, and therefore more efficient. The oil baths are kept at a constant temperature by a water jacket and the oil is mixed and kept uniform throughout the bath by air agitation. Houghton cylinder oil, which has a high viscosity is used. The advantage of oil as compared with water is not that it gives any particular quality to the steel but because it radiates heat more slowly and permits the steel to be cooled more evenly.

The result of all this care in manufacture is that the Hoover company is able to guarantee satisfactory results to the purchaser of automobile springs.

HALL-SCOTT MOTOR CAR CO. CONSTRUCTS ARMORED MOTOR CAR FOR THE WAR DEPARTMENT

The Hall-Scott Motor Car Co., of Berkeley, has recently constructed for the War Department an armored motor car of unusual design. The car was not intended for overseas work, but is to be used for experimental purposes. The general structural details were determined by the special requirements of the Department. The car has a square box-like appearance with suitable apertures for gun-mounts, doors, and windows. Advantage was taken of the general design to make the sides and roof into a box truss, the sides of the car forming the main supporting element, rather than to depend on the under-body structure as is common in railway-car construction.

The car complete weighs 200,000 lb., is 62 ft. long, 10 ft. wide, and 13 ft. 6 in. high from the track to the top of the car. The roof-plates are $\frac{1}{4}$ in. and the side-plates $\frac{3}{4}$ in. thick. The great weight necessitated the design and construction of body-bolsters of unusual strength as the car proper was supported on the outer ends of the body-bolsters and through these body-bolsters on the centre plates resting on the trucks.

The armament consists of four machine-guns, one at each corner. Additional port-holes for small arms were arranged along the sides and in the controlling-tower in the centre. To absorb vibration and to resist the effects of heat and cold, the ceilings and walls have an inner sheathing or lining attached to them. A space was left between the inner and outer walls, which was filled with felt insulating-material. The car is electrically lighted throughout, with one headlight on either end and one large 1000-watt searchlight, which can be controlled from the interior of the car in such a way that it can be elevated, revolved, and tilted at any

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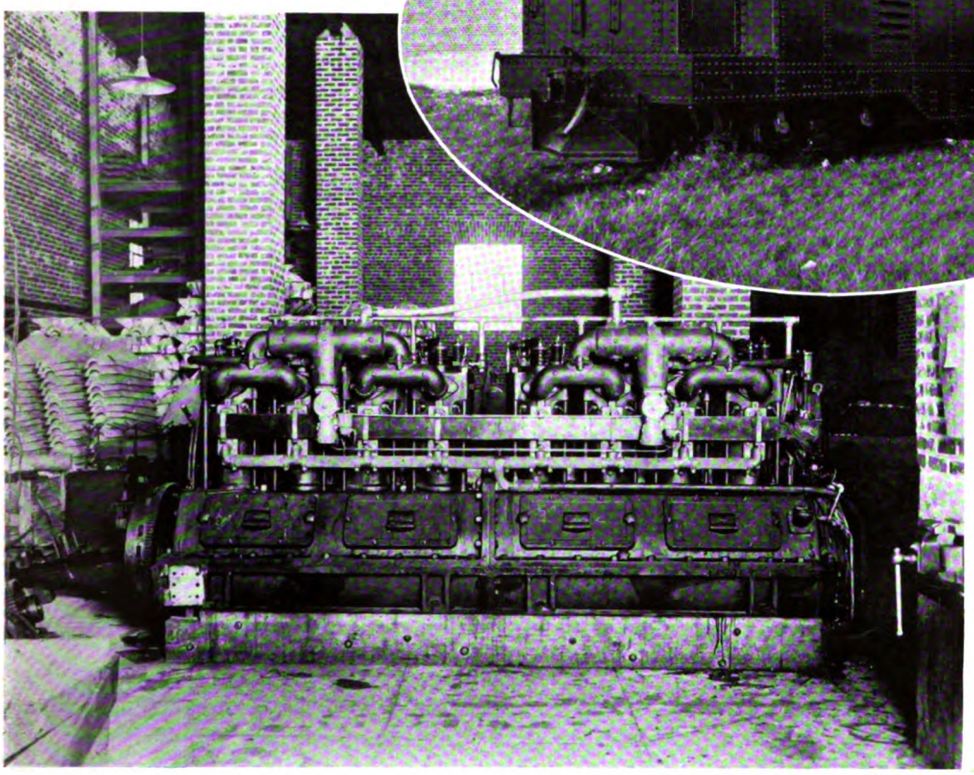
angle. Suitable quarters were arranged in the car for the accommodation of the crew.

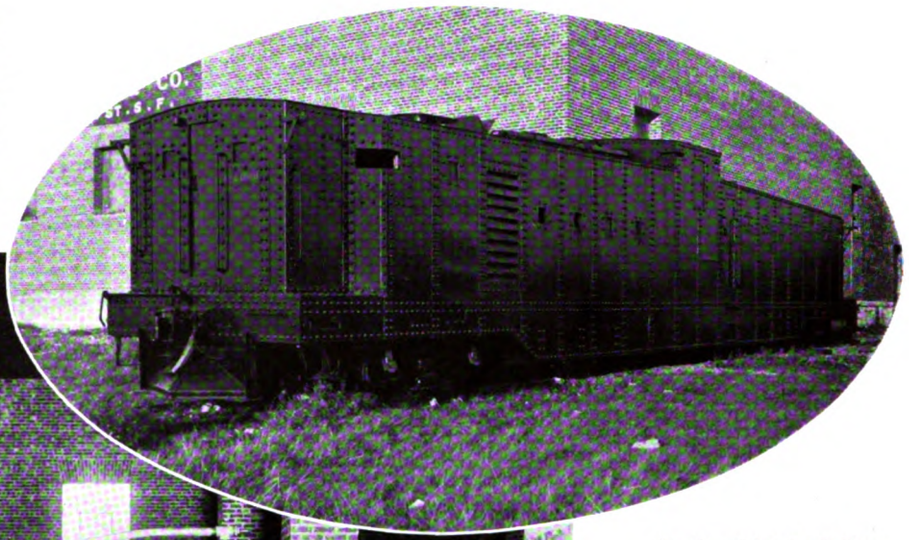
The trucks under the car are of the short-wheelbase heavy-duty locomotive-tender type, especially adapted for accommodating clasp-brake rigging. On account of the weight of the car and the speed at which it can travel it was necessary to design the brake rigging for 90% efficiency, which necessitated clasp rather than standard brakes. The trucks are protected with side-shields. Air and fuel tanks are placed under the floor, where they are protected by the side armor.

The power-plant consists of a heavy-duty distillate engine of unusual design. The design of the car requires that the controls be operated from a central observation-platform. The car had to be moved in either direction with equal speeds, from a few miles to as high as 60 miles per hour. To provide this motive power the engine was designed like a modern automobile on a large scale. While of the heavy-duty, slow-speed type, it is capable of quick acceleration and sensitive control. A large three-speed transmission-unit provides for operating the car at speeds ranging from 10 to 30 miles per hour at a fixed engine-speed. A specially designed reversing mechanism is placed on the rear-truck, the drive being transmitted to the rails through two wheels. This reversing mechanism is connected to the transmission with a drive-shaft and several specially designed universal joints. Between the transmission and the engine proper a large dry-plate clutch is interposed. This clutch is thrown out by compressed air and returned by spring-pressure. The transmission change-speed gears are shifted with hand levers. The reversing mechanism is operated in one direction by compressed air and in the opposite direction by coil-springs. All the controls of the car are arranged adjacent to the engineer's seat so that he has ready access to the spark, throttle, clutch-control, transmission and reverse-mechanism controls, and engineer's air-brake valve.

The engine is eight-cylinder, vertical, with 10-in. bore and 12-in. stroke and developed 300 hp. at 600 r.p.m. Carburetion is arranged so as to start with gasoline and to run with distillate. Ignition is accomplished with high-tension magnetos and a battery distributor. In conjunction with the engine an air-compressor was arranged to maintain the air-pressure in the reservoirs. The compressed air is also used for starting the engine. The engine is water-cooled and to keep the water at an even temperature it is circulatd by means of a centrifugal pump through two radiators, which are placed within the car. To produce energy for the electric current, and to keep the batteries charged, an auxiliary power-plant was installed that can be operated to run a generator and an auxiliary air-compressor. This additional compressor was provided in order to maintain air-pressure in the tanks during any period when the large plant was inactive, so that it can be started through the air-valves at any time.



Engine on Testing-Block



Car Completed for Delivery

Details of this car, while they represented a complex problem in the original design provided, when completed, a simply operated unit. Any person familiar with automobiles could handle the car readily. The car has been completed and delivered to the War Department on the Atlantic seaboard.

TITANIC METAL

In producing titanic metal, the National Smelting Corporation has solved the problem of eliminating tin from bearing metal without sacrificing quality, although reducing the cost. To assist in the conservation of raw tin, which was so important in the winning of the War, the company made laboratory and shop experiments in order to produce a metal that would be as satisfactory as the tin-base metals. These have been the standard ever since Isaac Babbitt

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(1799-1862) developed the first formula that made possible the efficiency of modern high-speed heavy-duty machinery.

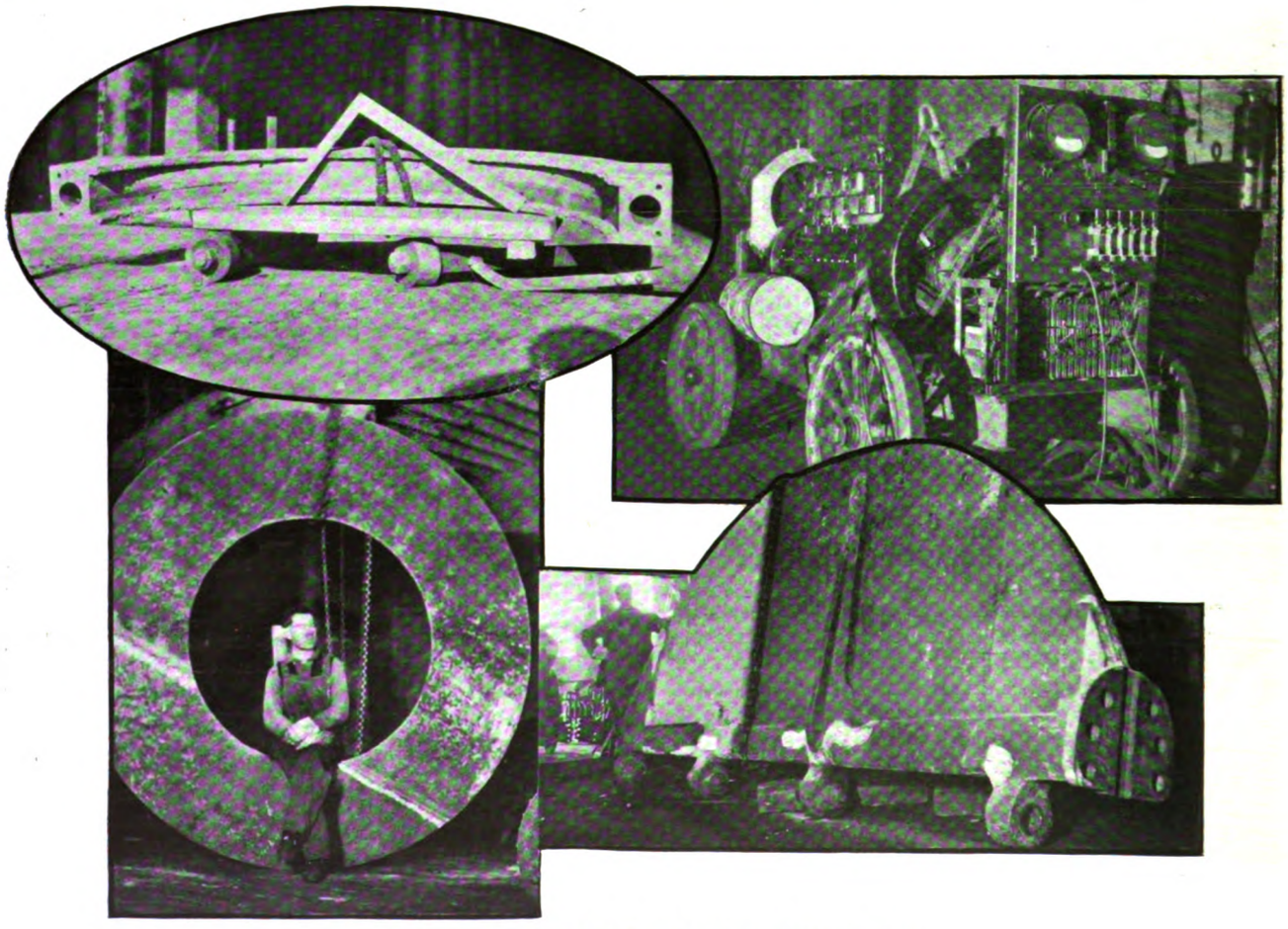
So far as science has been able to learn, the reason that anti-friction alloys generate so little heat under conditions that ordinarily would burn harder metals, is that these soft-metal alloys or mixtures are so composed that hard particles of one or more metals are imbedded in a matrix of a softer metal or metals. With the revolving of the shaft, these harder particles are worn away and begin to travel with the shaft. This traveling reduces them to spherical shape. Thus they furnish what practically amounts to numberless 'ball-bearings' for the shaft. However, were it not for the soft matrix of the alloy, these millions of tin 'ball-bearings' would shortly escape through the ends of the box, but they are constantly being imbedded in the matrix and, with a properly prepared alloy, only sufficient of them are literally 'dug out' at a time to accommodate the shaft. In titanic metal, the ideal soft matrix-hard particle mixture of metals has been created.

Brown Bros. Welding Co. has recently installed a 400-ampere General Electric welding set and panel in its shop at 223 Main street, San Francisco. A gasoline-engine driven portable outfit that can be transported on wheels has also been built. It is run by one operator and is rigged so that it can be handled by tackle and lowered into the hold of a ship. The experience of the company indicates that many jobs cannot be handled to advantage by acetylene welding. This is particularly true of large castings that may be affected by heat developed by the acetylene flame. The top picture in the group shows an eccentric cap upon which the guides have been built up by the electric apparatus. Excessive heat would undoubtedly have warped the cap out of shape. The lower picture shows a 1-in. plate that was electric-welded without distortion. A number of shrinkage cracks were welded in the rudder in the illustration. If acetylene had been used, the greater area affected would probably have caused other cracks.

HALL-SCOTT MOTOR CAR CO. PREPARES FOR POST-WAR WORK

In order to meet demands for machine products in quantity, several changes have been made in plant equipment during the last few weeks. Since the cancellation of war orders reduced production of military material, contracts for manufacturing special parts of shipbuilding equipment, farm-tractor motors, and machine products of other kinds have kept the shops of the company busy. Seven acres of additional land have recently been purchased. New factory buildings of modern design and of reinforced concrete fireproof construction are being erected. The plans call for a considerable increase of space in the car-building shops, where self-propelled railway motor cars will be built. Several orders for these have been on file for months prior to the signing of the armistice.

At the time the United States entered the War, the Hall-Scott Motor Car Co. was the only plant in the United States equipped with the engineering skill, practical experience, and actual manufacturing facilities for the production of a thoroughly tested aeroplane engine developed through ten years of costly experimental progress. The company cancelled a number of railway motor-car orders, and telegraphed to the Aircraft Production Board at Washington that its facilities were at the disposal of the Government. Since then it has been busy on the production of several thousand training-plane motors, E. J. Hall, vice-president



Portable Electric Welding Outfit and Specimens of Welding Work

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and chief engineer of the company, has been serving the Government as Chief of the Technical Section, Air Service, United States Army, in France, with the rank of Colonel. He had charge of air-service work, directly responsible to General Pershing. His department passed on all air-service equipment, engines, and material, before it reaches the actual fighting front. It was on the recommendation of Colonel Hall that the designing and engineering staff of the Air Service at Washington changed the first designs and increased the power of the Liberty engine. Colonel Hall is returning to the West Berkeley plant of the Hall-Scott Motor Car Co., and will again be in charge of its engineering and producing departments.

TRADE NOTES

American Marine Iron Works, of Portland, will construct a $50,000 repair-shop.

The Associated Oil Co. is spending $500,000 for improvements and additions at its refinery at Avon.

The Moore Shipbuilding Co. has completed the erection and is installing furnaces in its new brass-foundry.

Lisenby Manufacturing Co., of Fresno, is preparing to manufacture tractors, cultivators, and other farm machinery.

Griffin Car Wheel Co., of Los Angeles, Seattle, and Denver, has a contract from the Railroad Administration for 126,000 car-wheels.

Larsen-Sampson Co. will construct an eight-story class A building in Salt Lake City for Mrs. V. Clift. The estimated cost is $600,000.

An election will be held in Salt Lake county, Utah, on February 13 to vote on a bond issue of $1,500,000 for highway improvements.

Parr-McCormick Steamship Line received bids on January 30 for the construction of a new wharf at its terminal on the Oakland waterfront.

The Forderer Cornice Works has been awarded a contract for furnishing sheet-metal work at the Groveland shop on the Hetch Hetchy project.

The Higginson Co. is constructing a brick blacksmith-shop on Hawthorne street near Folsom for the American Railway Express Company.

Southern Sierras Power Co. will construct a second high-tension transmission-line from El Centro to Calexico. The estimated cost is $35,000.

The Southern Pacific Co. is constructing at its Sacramento shops a corrugated-iron steel-foundry building and a reinforced concrete car-repair shop.

The Des Moines Bridge & Iron Co. has been awarded a contract for constructing a 500,000-gal. steel water-tank for the city of Seattle. The contract price is $42,760.

The Schmeiser Manufacturing Co., of Davis, reports prospects for a good demand for the land-levelers and other agricultural machinery made by the company.

The Link-Belt Co. has opened offices in the Hobart building, under the management of E. C. Berghoefer, who was formerly in the Chicago office of the company.

J. D. Hannah, Chronicle building, has been awarded the contract for the construction of a bulkhead-wharf building at pier 41 for the State Board of Harbor Commissioners.

Clark & Henery Construction Co. has been awarded the contract for the construction of a sewer system and disposal plant at Globe, Arizona. The estimated cost is $226,000.

Fairbanks, Morse & Co. have been awarded a contract for furnishing pumping and electrical equipment for the new municipal water system at Martinez. The contract price is

A course of 15 lectures on **'Foreign Trade'** is being given in San Francisco by Herman Virde under the auspices of the **University of California Extension Office,** 559 Market street.

The Union Iron Works, of Los Angeles, has moved its contracting and engineering departments from the Stimson building to the main manufacturing works at 5125 Santa Fe avenue.

James L. McLaughlin has been awarded a contract by the State Board of Harbor Commissioners for the construction of a bulkhead building on pier No. 33. The contract price is $82,529.

H. P. Hoyt, who has the general contract for the construction of the American Manganese Steel Co. on the Oakland waterfront, has sub-let the structural steel to the California Steel Company.

Colman Creosoting Co., of Seattle, has been awarded a contract for furnishing 12,000 creosoted piles to the Port of Seattle Commission for the construction of the new pier 'B' at Smiths Cove.

Charles M. Woods has purchased the interest in the firm of **Woods & Hausen** formerly held by **G. J. Hausen,** and the business will hereafter be conducted under the name of **Charles M. Woods & Company.**

Woock Bros., of Lodi, have organized the **Superior Manufacturing Co.** and will construct a concrete factory building just outside the city limits. The company will manufacture pumps and pumping equipment.

The large Government contracts on which the **Holt Manufacturing Co.** of Stockton has been engaged for nearly two years, are practically completed, and the company is prepared to take up private work again.

E. B. Kingman and **A. W. Miller,** of Eugene, Oregon, have formed a corporation to construct a sawmill either in or near Eugene to handle timber from a tract in that vicinity. The capitalization of the concern is $800,000.

Frederick W. Kiesel, of Sacramento, has applied to the State Water Commission for permission to divert water from the Sacramento river for irrigation in Sacramento county. He intends to use a 15-in. centrifugal pump and a 75-hp. motor.

Southern California Edison Co. has applied to the State Railroad Commission for permission to issue $16,000,000 worth of bonds, $10,000,000 of which is to be used for refunding other obligations, and the remaining $6,000,000 for new construction.

Los Angeles Pacific Navigation Co. has been incorporated with a capital of $1,000,000 to operate vessels between Los Angeles and South American and Oriental ports. The officers are L. D. Sale, Stoddard Jess, Paul Shoup, Willis Booth, and Leo Chandler.

Sperry Flour Co. will construct a reinforced concrete flour-mill at Ogden, Utah. The capacity will be 200 bbl. per day, and the elevators, also of reinforced concrete, that will be built in connection with the project, will have a total capacity of 1,250,000 bushels.

H. C. White, who has been with the **Holt Manufacturing Co.,** of Stockton, for the past two or three years, assisting in the reorganization and expansion of that plant, has been appointed factory manager for the **Harris Manufacturing Co.,** of Stockton. The Harris company has enlarged its facilities materially during the past few months, permitting

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a considerable increase in its output of harvesting machinery. About 225 men are employed at the plant.

Sacramento Steel-Hammer & Forge Co., of Sacramento, does a general jobbing and repair business, principally for the dredges in that vicinity, and also makes forgings for the Harris Manufacturing Co., of Stockton. The shop is equipped with a 2500-lb. hammer.

George W. Kneass, 18th and Illinois streets, is building eight launches for the Peterson Co. Four will be 56 ft. long, 16 ft. beam, and 6 ft. draft. The other four will have the same beam and draft, but will be 64 ft. long. They will be equipped with 115 to 125-hp. engines.

Wellman-Seaver-Morgan Co., of Cleveland, has opened a branch office in the Rialto building in charge of Norman S. Ross. Mr. Ross' territory includes California, western Nevada, southern Oregon, and Lower California. He was formerly manager of the company's Seattle office.

California Tractor & Implement Association has decided to hold its annual tractor exhibit at Sacramento this year. The place selected is a 500-acre tract at Del Rio, on the Freeport road, about a mile south of the city. The exhibit will probably be held during the first week in May.

Peerless Iron Works, of Sacramento, has increased its facilities, and besides continuing to manufacture its line of centrifugal pumps, now does a considerable business in gas-engine parts and general repair work. In addition to the machine-shop, there is a foundry with a 26-in. cupola.

Cleveland Pneumatic Tool Co. has installed a small compressor and other testing equipment in the rear of its office at 515 Mission street. C. J. Albert, western manager for the company, states that all tools will be cleaned and tested before being sent out. The office is also equipped to give repair service.

The Engineering & Foundry Co., of Stockton, reports a large volume of orders. Besides making all the castings for the Harris Manufacturing Co. and other concerns, the company does a considerable jobbing business. In addition to a number of hand-molders, three molding machines are kept busy on repetitive work.

The Modesto and Turlock Irrigation Districts have received the report of A. J. Wiley, consulting engineer, endorsing the proposed Don Pedro dam. The total estimated cost of the project is $3,489,000. Besides the main dam, which will be of reinforced concrete, the project includes eight miles of railroad, and a 12,000-kw. power-plant.

Monarch Foundry Co., of Stockton, is making extensive alterations in its plant including complete new offices. Besides its own line of centrifugal pumps, the company makes steel and iron castings not only for local manufacturers and consumers but also for others throughout the State. A one-ton Heroult electric furnace is used for the steel castings. In addition to the foundry, the company has well-equipped pattern and machine shops.

The office of the **Davis-Bournonville Co.,** handling oxy-acetylene apparatus and supplies, has been moved from 602 Mission street to 71 New Montgomery street. The new quarters gives the company a larger and better office and storeroom. In addition, there is an 80-ft. basement which will be fitted up as a machine-shop for repair work. C. M. George, district sales manager, states that beginning January 1 the company will assume freight-charges west of the Rocky Mountains, together with cartage, which will make prices here the same as in New York city. G. A. Gehlert, the welding-expert, has been employed as service-man. He has just returned from a two and one-half months trip to the factory and through the East, which he made for the purpose of studying the latest wrinkles in cutting and welding.

Personal

Wallace H. Dow is in the East on a six weeks business trip. He expects to return about the middle of February.

John A. McGregor and **Louis Luckenbach** have gone to Japan to supervise the construction of ships being built there for the Emergency Fleet Corporation.

Frank A. Stanley has been appointed factory manager for the Marchant Calculating Machine Co. of Oakland. Mr. Stanley retains his connection with 'The American Machinst'.

William A. Rideout has resigned his position at the Potrero plant of the Bethlehem Shipbuilding Corporation to become assistant engineer for the U. S. Shipping Board, Gulf Division.

Walter B. Townsend, formerly agent for the Western Pacific Railway Co. at Oakland, has been appointed traffic manager for the new terminal under construction on the Oakland waterfront for the Parr-McCormick Steamship Line.

W. D. Bunker, formerly vice-president and general manager for the Judson Manufacturing Co., and who resigned that position to enter the Army, has returned and has opened an office in the Call building as a manufacturers' representative and mechanical and electrical engineer.

Michael J. Roche, formerly justice of the peace, has been appointed Superior Judge of the city and county of San Francisco, to fill the place made vacant by the death of the late J. V. Coffey. Before he fell from grace and studied law, Mr. Roche was a molder, and he is still a member of the Molders' Union.

C. W. Cook, formerly assistant director of operations for the U. S. Shipping Board, with headquarters at San Francisco, has resigned and will resume his old position in charge of operations for the American-Hawaiian Steamship Co. He has been succeeded by **Harold H. Ebey,** formerly manager for the Kosmos Line.

C. V. Folds, of the Pelton Water Wheel Co., has returned from Norway where he installed seven 4500-hp. Pelton impulse-wheels in the power-plant of an aluminum reduction works at Stavanger. Mr. Folds reports that tobacco became so scarce there during the War that the men were driven to smoking native weeds, and that bay rum and the alcohol from shellac took the place of pre-war beverages.

Book Reviews

Coremaking. By Richard Moldenke. Pp. 44, index. Published for distribution by the Corn Products Refining Co., New York.

This useful book contains a discussion of the uses of cores and the general principles of coremaking and gives the results of a series of tests of cores made with different binders with different proportions and baking-temperatures. The book also contains a number of tables and other general information of value to foundrymen.

Topographic Stadia Surveying. By C. E. Grunsky. Pp. 95, ill., index. D. Van Nostrand Co., New York. For sale by 'Mining and Scientific Press', San Francisco. Price, $2.

This book comprises a discussion of the theory and practice of stadia surveying together with reduction tables for both horizontal and vertical distances and a reduction chart. The surveyor that wishes the data on this subject in a compact form with no additional matter will find the book of value.

PUNCH WANTED

Wanted to purchase one power punch suitable for punching 3/4 inch hole in 5/16 inch stock. This need not be a deep throat punch. In reply state price. Address Opp., 104, Metal Trades.

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